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Ira B. Hoke

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The Optics of Sound Recording Systems

By Arthur C. Hardy

Associate Professor of Optics and Photography, Massachusetts Institute of Technology, Cambridge, Mass.
Read at the Fall Convention of the S. M. P. E., 1928. Held at Lake Placid, New York.

(Continued from January Cinematographer)

Recording with a Kerr Cell

In the systems that have just been considered, the brightness of the light source was modulated by introducing the amplified sound current into its supply circuit. Unfortunately there are only a few discharge tubes which will follow the rapid changes in sound intensity and the brightness of these sources is usually low. Until glow lamps of higher intrinsic brightness are developed, it will be necessary to use other sources of light for high quality recording since the amount of light available with the best of glow lamps at the present time is barely sufficient to expose cine negative film. The low resolving power and bad graininess of this material make it undesirable for sound recording purposes, and, as the desirable photographic characteristics are obtainable only at the sacrifice of sensitivity, it is customary to use a light of higher brightness with some sort of modulating device or light valve. The simplest of these is the well-known Kerr cell.

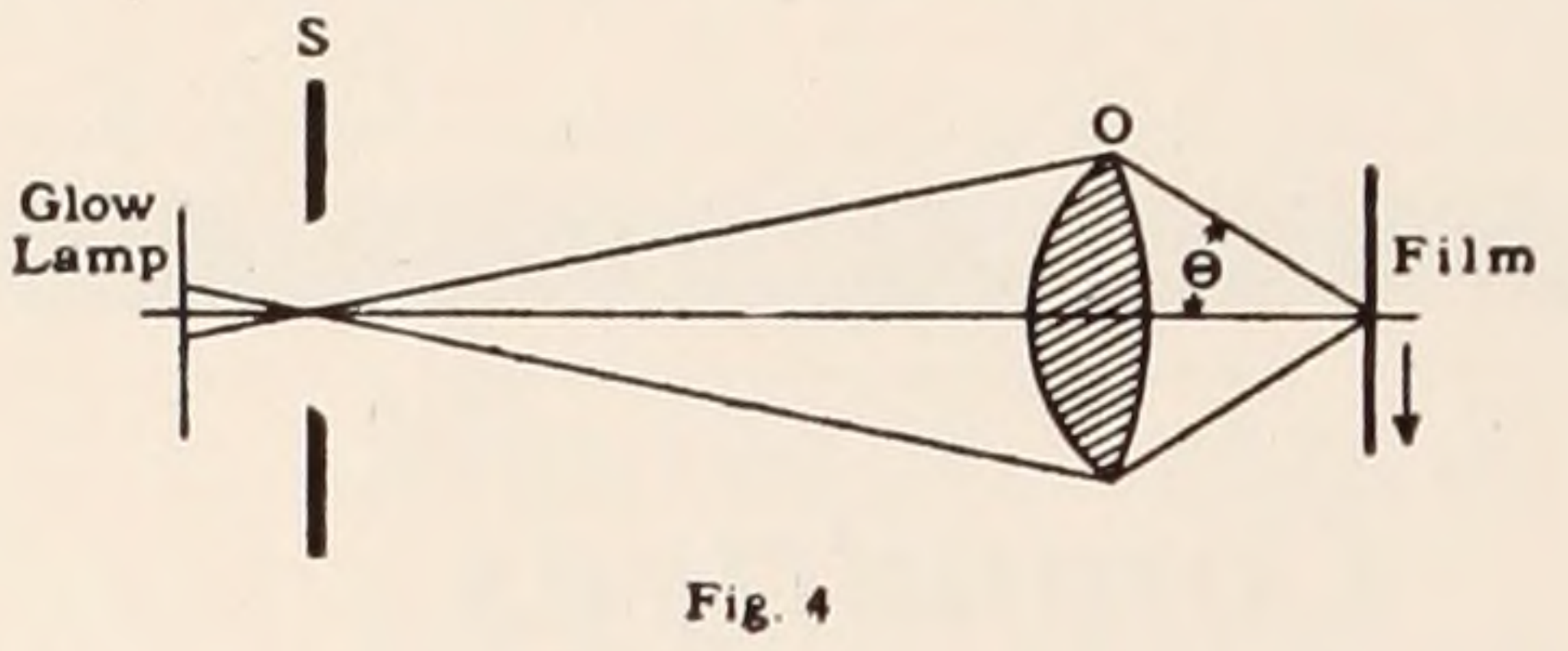

Fig. 4

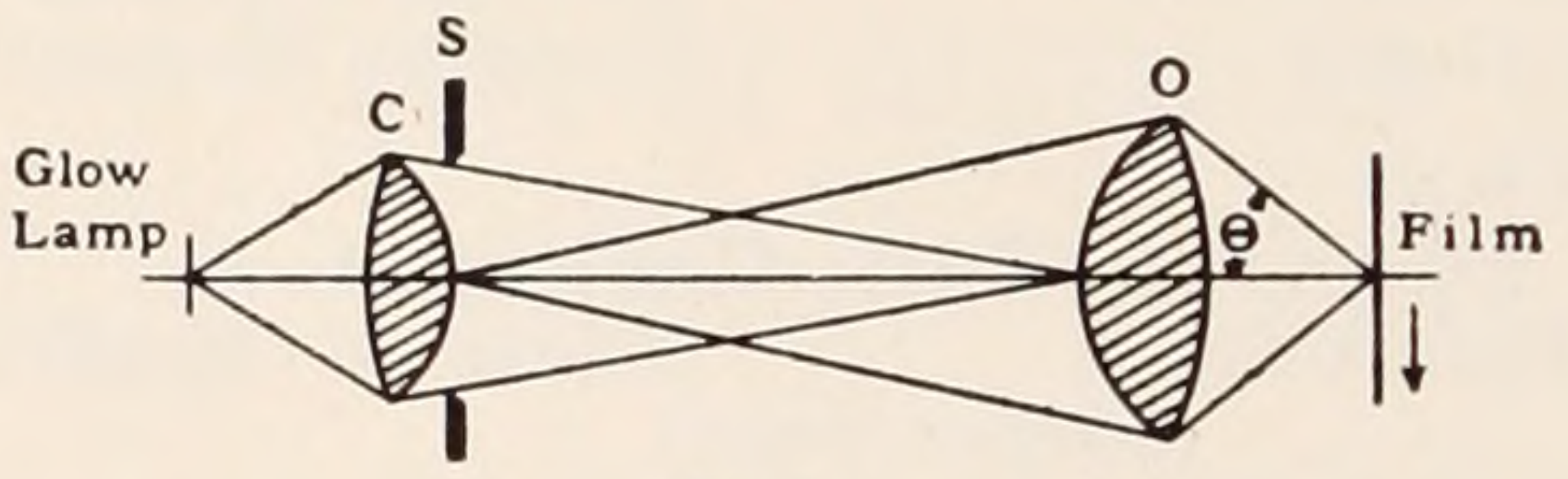

Fig. 5

The Kerr cell consists of a pair of electrodes in a liquid such as trinitrobenzene which has the property of becoming doubly refracting in an electrostatic field. A sound recording system using such a cell is shown in Fig. 6. Light from any source of constant brightness, such as the filament of an incandescent lamp, passes through the collimating lens and then through a polarizing Nicol prism before entering the Kerr cell. On leaving the cell the light passes again through a Nicol prism and a lens which forms an image of the filament source on the slit in front of the film. The second Nicol prism is so adjusted with respect to the first that when no voltage is applied to the electrodes of the cell they transmit one quarter of the incident light. When the signal voltage is applied to the cell, the exposure of the film is increased or decreased in a manner which corresponds roughly to the original variations in sound intensity.

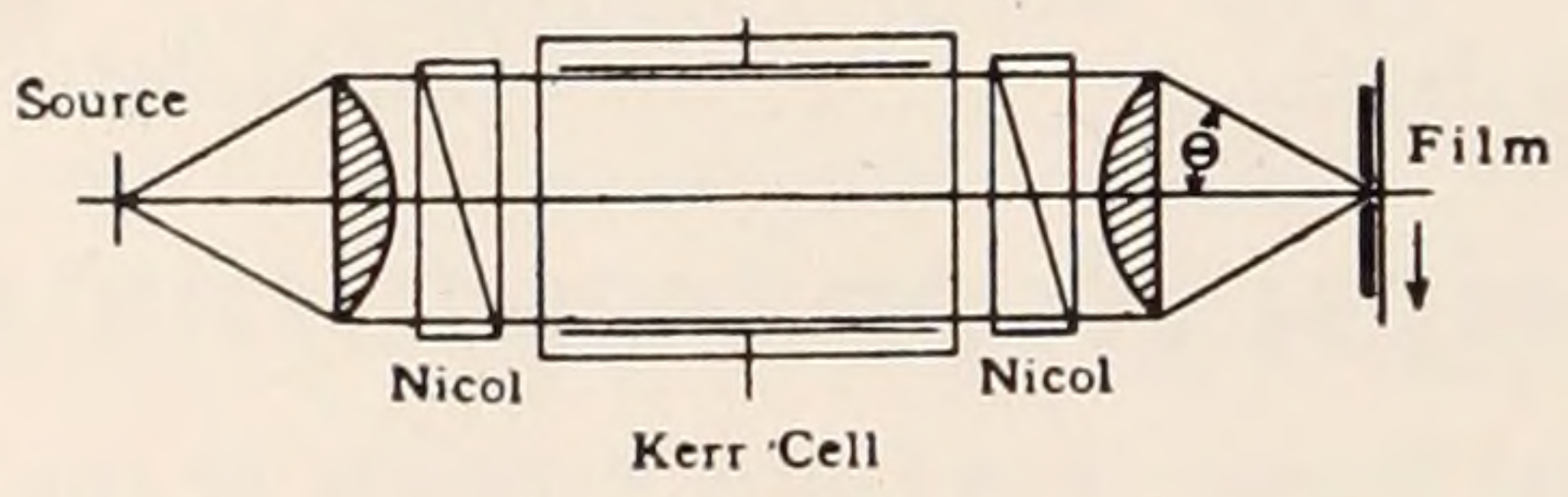

Fig. 6

Diagram of the Kerr cell recorder.

It is obvious that the optical system of Fig. 6 is fundamentally the same as that shown in Fig. 2 provided that the Nicol prisms and Kerr cell are of sufficient size. In other words if the second lens is the aperture stop, as Fig. 6 shows, the angle θ may be made sensibly the same as in the case shown in Fig. 4. Although the normal setting of the Nicol prisms decreases the average illumination to one quarter of the amount available without them, the brightness of the filament of an incandescent lamp is many times greater than the brightness of any glow lamp having a reasonable life. Consequently, recording may be done with the Kerr cell arrangement on a less sensitive and better adapted type of photographic material.

Recording with a String Galvanometer: String Vertical

Of the mechanical devices which might be used for light valves, the simplest is undoubtedly the string galvanometer. This consists of a wire or ribbon called the string, suspended in a strong magnetic field. The passage of current through this string causes a deflection which may be made to open or close a suitable aperture. The string is normally adjusted to fill half of the opening when it carries no current. Then when a signal is impressed on the galvanometer, the resulting oscillations of the string cause corresponding variations in light flux which may be used for photographic recording. Ordinarily the film travels in a vertical plane so that the recording slit is horizontal. The string can be placed either vertically (across the slit) or horizontally (parallel to it).

Sound records of the variable width type can be made with the string vertical, but the illumination is so low that such a procedure is not practical. To secure good quality, the natural period of the string must be less than that of the highest pitch to be recorded. This means that the string must be light and consequently incapable of large deflections. In practice it is difficult to obtain deflections greater than 0.001 inch in a galvanometer having a satisfactory frequency response curve. As this deflection must be magnified nearly 100 times to fill a sound track of the usual width, the available illumination is necessarily low (see footnote 4).

By means of a suitable system of cylindrical lenses, the magnification between the string and the film may be 100 to 1 in the horizontal plane and 1 to 1 or better in the vertical plane. In the Kerr cell arrangement of Fig. 6 the magnification between the source and the film was 1 to 1 in both planes. Consequently, neglecting for the moment the absorption of light by the Kerr cell and the loss caused by the Nicol prisms, this type of string galvanometer arrangement can be only 1/100 as efficient in light-gathering power as the Kerr cell arrangement. If we continue to neglect the absorption in the cell but remember that the Nicol prisms reduce the illumination to one quarter of the value it would have otherwise, we find

---

[4] Since the numerical aperture of a microscope objective is usually known, it is frequently more convenient to use equation 4 instead of equation 6. The numerical aperture of a microscope objective used in air is equal to the sine of the angle θ when the objective is used at the magnification for which it was designed. As the objective shown in Fig. 4 is used for reduction rather than for magnification, the sine of the angle θ is equal to the indicated numerical aperture when the distance from S to O is roughly 160 mm. The sine of θ varies inversely as the magnification plus one. Consequently, when the magnification is less than 1, as in Fig. 4, the illumination depends very little upon the magnification. For high values of the magnification it is nearly inversely proportional to the square of the magnification.

[5] This assumes the use of a glow lamp of the same brightness and the same effective slit at the same magnification in both cases as explained in the last footnote.

that the Kerr cell is some 25 times better than a string galvanometer used in this manner.

Fig. 7 shows a method of using a string galvanometer with the string vertical to produce a variable density type of record. The upper diagram represents a plan or horizontal view of the system and the lower diagram a vertical elevation. The source of light is focused by means of the condensing lens C on the ribbon of the galvanometer. The galvanometer is imaged on the film in the vertical plane by means of a cylindrical lens. Consequently, the solid angle of the cone of light (or pyramid of light in this case) reaching the film is the product of the angles θ_1 and θ_2.

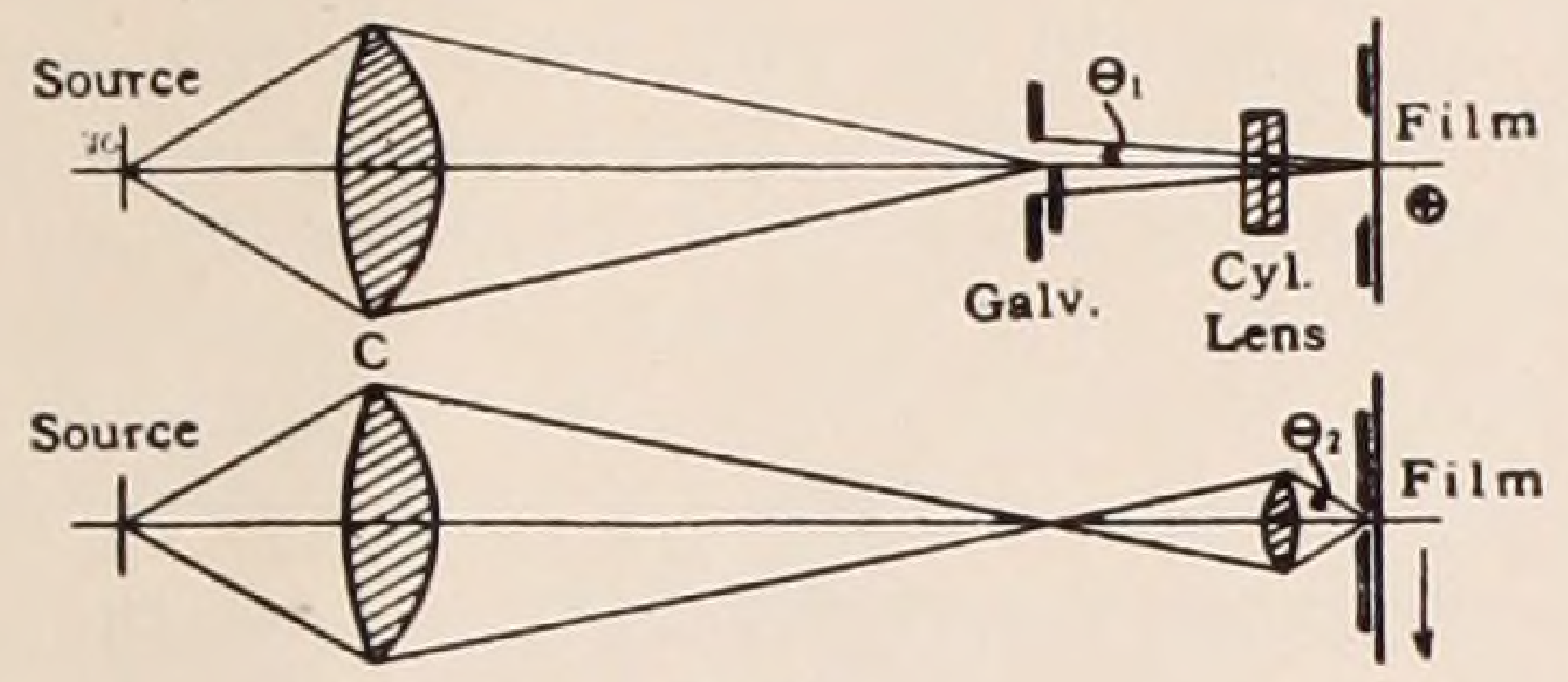

Fig. 7

Method of using vertical string galvanometer for making variable density type of record.

It is obvious that the value of θ may be made approximately as great as the angle θ in the Kerr cell arrangement of Fig. 6. The maximum value of θ_1 requires a little more careful consideration. If no mechanical difficulties were encountered, the galvanometer should be placed as close to the film as possible, the limit being reached when the opening subtends the same angle from the film as the lens C. In other words, except for mechanical limitations θ_1 may approach the value of θ_2 in a well-designed system.

If, as usually happens, the magnets of the galvanometer prevent it from being placed as close to the film as desired, the string can be imaged at the proper point by means of a cylindrical lens inserted in the upper diagram. Since the opening in the galvanometer, however, is already as bright as the source and since it is impossible to increase this brightness by any optical system, the limit of light-gathering power of the latter system is the same as the case just considered. Consequently we may sum up the consideration of the vertical string type of string galvanometer with the statement that by properly designing the optical system it may be used to produce records of the variable-density type but is quite useless for the production of records of the variable-width type.

Recording with a String Galvanometer: String Horizontal

We have already seen that the deflection obtained with a string galvanometer suitable for recording high frequencies are small, usually of the order of 0.001 inch or less. Since the width of the slit is of this order of magnitude, it is possible to make sound records of the variable-density type by means of the system shown in Fig. 8. The source of light is focused on the film. Each of the four lenses shown may conveniently be a microscope objective of 66 mm. focal length and 0.25 numerical aperture. Since the magnification of the source of light on the film is approximately unity, the illumination is four times as intense as that produced by the same objectives used in the Kerr cell arrangements of Fig. 6 because of the loss occasioned by the Nicol prisms. The sound produced by this system is slightly distorted in the high frequencies, when the velocity of the string approaches that of the film. Since the effect of distortion, however, is to introduce higher harmonics, it may not be serious because of their relative inaudibility. This arrangement is as satisfactory as any for the production of sound records of the variable-density type. Records of the variable-width type are difficult to produce with a horizontal string galvanometer.

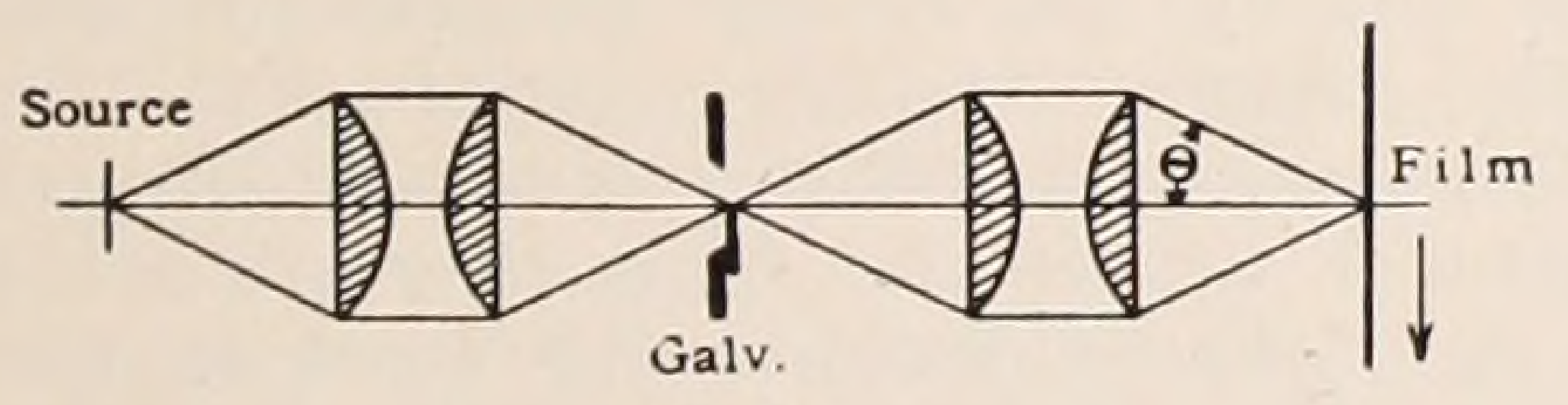

Fig. 8

Method of using horizontal string galvanometer for producing variable density record.

Recording with an Oscillograph: Variable Density Records

In the string galvanometer method of recording, a mechanical part such as a wire or ribbon is used as the movable portion of the light valve. Instead of utilizing an actual motion of this sort the equivalent effect may be produced by causing the image of some stationary aperture to move with respect to some other stationary aperture. This can be done most conveniently by the use of an oscillograph mirror.

The oscillograph consists essentially of two parallel wires stretched taut in a magnetic field. These wires are so connected together that the current flows upwards, say, in the one at the same time that it flows downwards in the other. A small mirror is attached by its edges to these wires in such a manner that a current causes a rotation of the mirror, usually about a vertical axis.

The optical system of the oscillograph has been made the subject of a previous investigation.[6] Fig. 9 shows an adaptation of this instrument to the production of sound records of the variable-density type. The source of light is focused on the oscillograph mirror which in turn is refocused on the film, Fig. 9 being a horizontal or plan view of the optical system. This figure has been drawn as though the mirror produced no deflection of the beam, but acted only as a stop or aperture in the system. In any actual case, of course, the light should fall as nearly perpendicularly on the mirror as possible and should be reflected in the same manner. At each of the objectives is placed a grid consisting of parallel wires or ribbons with alternate transparent spaces. At the oscillograph mirror is a single lens which images the first grid on the second. Since light traverses this lens twice, the effect is the same as if there were two lenses, and Fig. 9 has been so drawn.

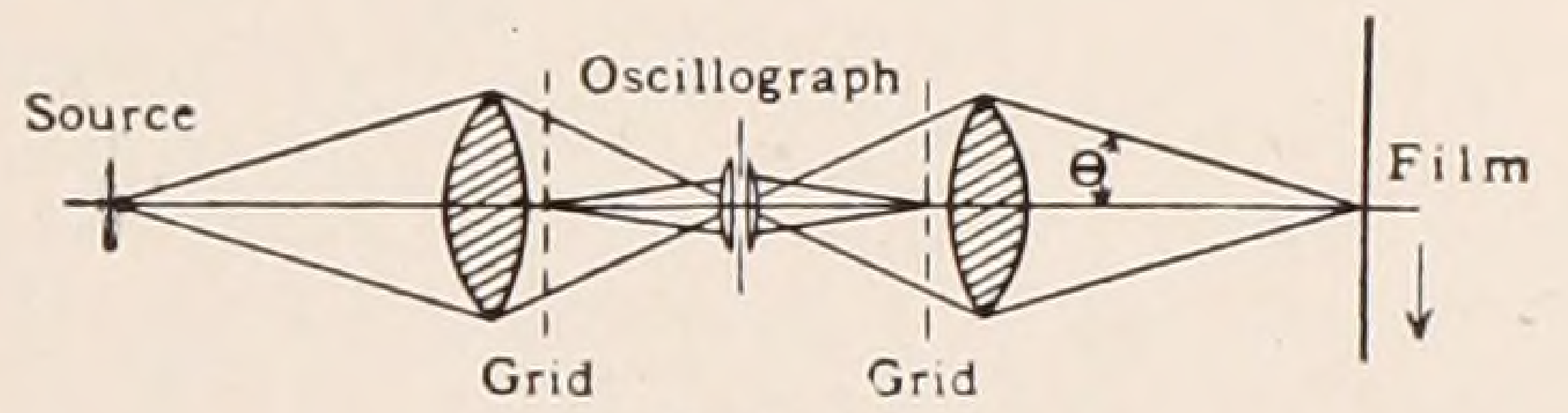

Fig. 9

Arrangement used with oscillograph for producing variable density records.

Before a program is recorded, the mirror is so adjusted that when no signal is impressed on the oscillograph, the image of the wires of the first grid half covers the spaces of the second grid. The grid should be so designed that the maximum deflection of which the mirror is capable will produce a shift of the image equal to one-half of the width of the spaces. Consequently, when a signal is impressed on the oscillograph, the amount of illumination at the film varies in accordance with the sound pressure at the microphone. This system has been shown with a close-up slit but it may be modified for use with an imaged slit as in Fig. 4.

In practice, the width of the mirror in a suitable oscillograph is rarely more than 0.5 mm. Since this mirror is imaged on the film, it must obviously be magnified at least six times in order to cover a sound track 3 mm. wide. Since the illumination in the image is about inversely proportional to the square of the magnification plus one (see footnote 4), it follows that in this case the illumination can be only 1/12 as intense as with the unit magnification of the system shown in Fig. 8. This may be partially remedied by inserting a cylindrical lens with its axis perpendicular to the plane of Fig. 9. This is usually possible because the height of the oscillograph mirror is greater than the width of the recording slit so that unit magnification or less can be used in this plane. If we assume the magnification in the vertical plane to be unity and the magnification in the horizontal plane to be 6, the light-gathering power with this arrangement is roughly two-sevenths as great as with the system of Fig. 8.

Recording with an Oscillograph: Variable Width Records

The difficulty of producing high quality sound records of the variable-density type has already been emphasized in a previous paper,[7] where it was shown that the characteristics of photographic materials are such that improper exposure or development will introduce distortion. This source of distortion can be eliminated by the use of sufficient care in the photographic phase of the problem, but it is doubtful whether this is justified at the present time. The variable width type of record is inherently free from this type of distortion and is easily produced by an optical system such as that shown in Fig. 10.

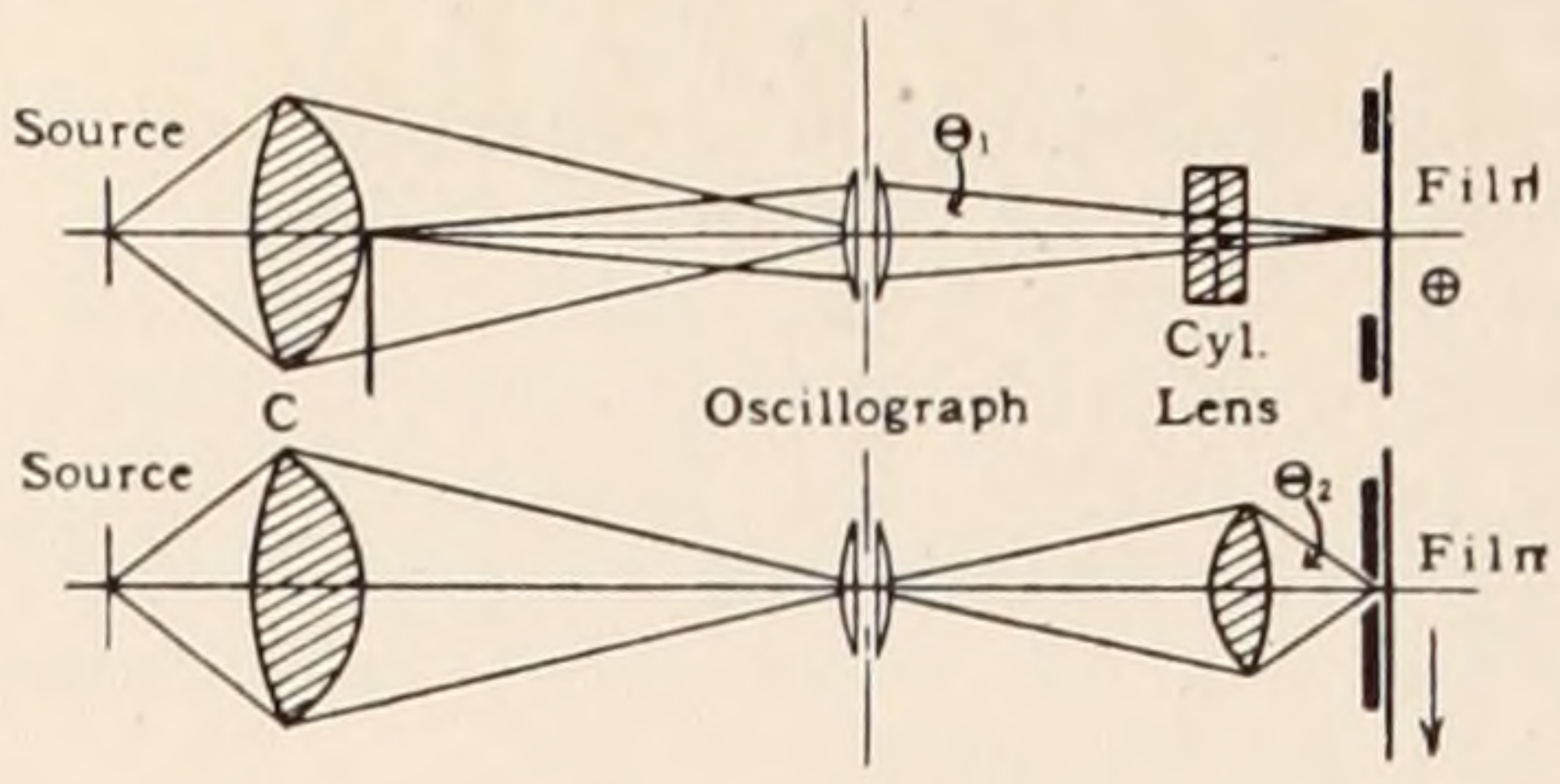

Fig. 10

Optical system for making variable width sound record with an oscillograph.

In this arrangement the source of light is focused on the oscillograph mirror by means of a spherical lens. As before, the mirror is drawn as though it produced no deflection of the beam. In the vertical plane, shown in the lower diagram, the mirror is refocused on the close-up slit by means of a cylindrical lens. In the horizontal plane the beam is allowed to diverge and cover the width of the sound track. A stop at the condensing lens C covers half of the area of the lens. This stop is reimaged on the film by means of the single lens close to the mirror, this lens being again shown double in the diagram since the light traverses it twice. The neutral position of the mirror is adjusted so that the image of the edge of the diaphragm at lens C occupies the center of the sound track. As the signal is impressed on the oscillograph, the image of the diaphragm moves from side to side and produces records of the well-known variable width type.

Since the light-gathering properties of the oscillograph have already been discussed at some length in the previous paper,[6] it is only necessary to refer here briefly to the general conclusions. As in the previous case, shown in Fig. 7, the illumination is proportional to the product of the angles θ_1 and θ_2. The angle θ_2 may have a value equal to that of θ_2, in Fig 7. On the other hand, the value of θ_1 depends on the distance from the mirror to the film which, in turn, depends on the sensitivity of the oscillograph vibrator. It is usually possible to obtain a deflection of one inch at a distance of ten inches without heating the vibrator enough to give it an undesirable frequency response. With a sound track 0.1 inch in width, therefore, the proper place for the mirror is one inch from the film. If it is placed closer than this, the full width of the sound track will not be utilized without overloading the vibrator. If it is placed at a greater distance, θ_1, the illumination will be reduced proportionately.

It is frequently impracticable to place the vibrator as close to the film as required by the optical considerations. In such cases, as we have seen before, the mirror may be imaged at the proper point, perferably by means of a cylindrical lens inserted in the upper diagram. Such a lens, however, is powerless to increase the illumination over that provided by the scheme shown in Fig. 10.

With a mirror 0.5 mm. in width and 25 mm. from the film, the numerical aperture in the upper diagram is only 0.01. Since this system, however, requires no modulation control with its attendant reduction in exposure it is very satisfactory for recording even on cine positive film.

This system has been considered with reference to the close-up slit arrangement only. From previous considerations, however, it is obvious that the slit could be imaged on the film, and it is likewise apparent that such a procedure is justified only as a matter of convenience from the mechanical standpoint rather than from any superior light-gathering characteristics of the imaged slit system.

Reproducing

We have already found that the illumination of the reproducing slit should be 200 lumens per square centimeter. This corresponds to the placing of a 200 candle-power lamp at a distance of 1 centimeter or the equivalent. The design of incandescent lamps is such that the bulb usually prevents placing the filament sufficiently close to the reproducing slit. As a consequence, it is customary to employ an optical system similar to that shown in Fig. 11. The filament is here imaged on the reproducing slit and the illumination may be calculated by means of equation **4**. Since the brightness of the average tungsten filament operated in such a way as to insure a reasonable life is of the order of 1200 candles per square centimeter, a microscope objective of 0.25 numerical aperture will produce an illumination at the slit of 235 lumens per square centimeter. As we have already seen, this will provide an average photoelectric cell current of about a microampere.

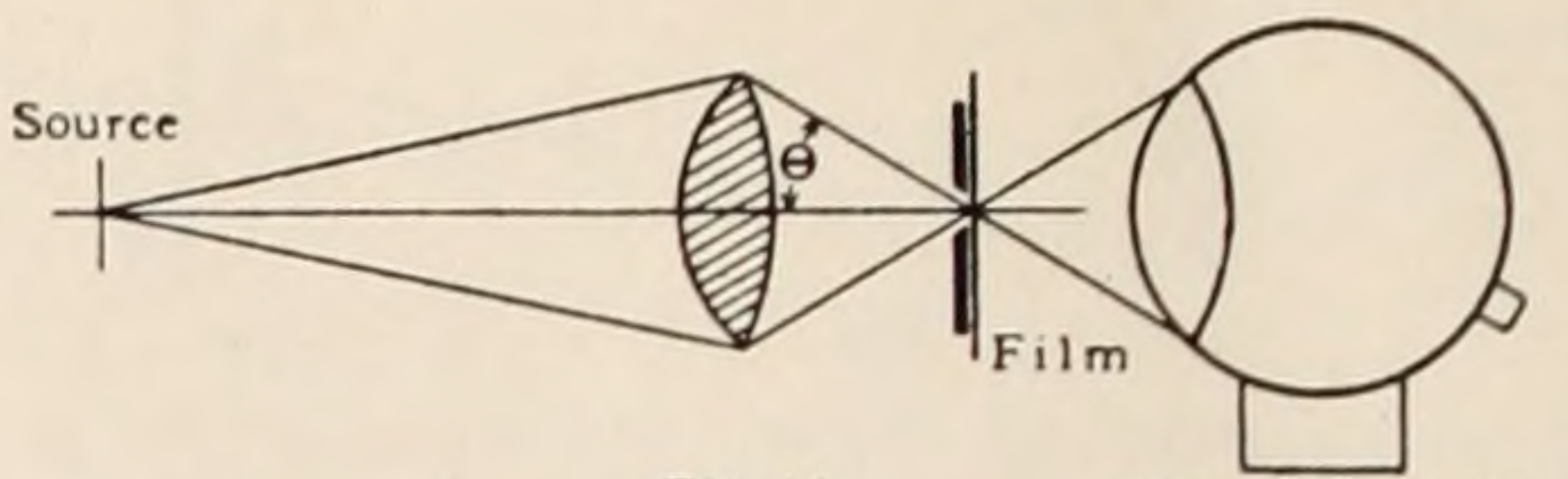

Fig. 11

Diagram of optical system of photoelectric cell reproducer.

The objections to a close-up slit apply even more forcibly in reproducing than in recording. Consequently it is preferable to use the system shown in Fig. 12, wherein the filament is imaged on the microscope objective O by a condensing lens C and a slit of generous dimensions is imaged on the film. If the objective O is filled with light, the flux reaching the photo-electric cell will be the same in this case as with the system shown in Fig. 11.

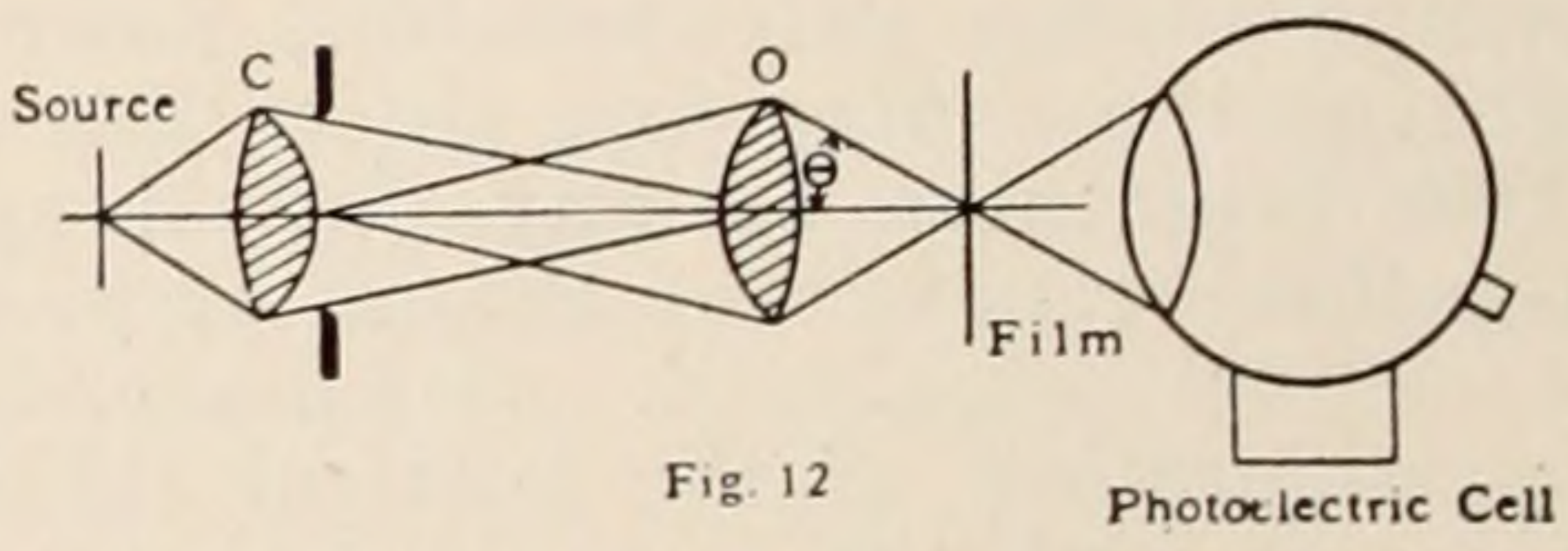

Fig. 12

Diagram of reproducer optical system with close-up slit eliminated.

Conclusion

The declared purpose of this paper was to illustrate the general method of computing the amount of light which passes through any optical system. Although this general method has been freely illustrated by examples chosen from among the better known methods of sound recording, it is impossible to compare the merits of the various systems without assigning actual numerical values to the quantities involved. This is due to the fact that the amount of light available with most systems depends upon mechanical or electrical limitations rather than optical ones. For example, in the case of a string galvanometer the amount of exposure on the film with a properly designed optical system depends on the displacement which may be given to the string and its current capacity. It is hoped, therefore, that the numerical values herein presented for purposes of illustration will not be interpreted as a final comparison of the merits of the various systems of recording and reproducing. The question of image perfection has been entirely ignored in the present paper for lack of space.

Charles Stumar, A. S. C., writes from Arosa, Switzerland, that he is engaged in shooting Universal's first German production, directed by William Dieterk, and starring Lien Deyers. The title of the picture is "The Triumph of Life." Charlie will be absent several months.

---

[6] "The Optical System of the Oscillograph and Similar Recording Instruments," by A. C. Hardy, J.O.S.A., R.S.I., 14, June, 1927, p. 505.

[7] "The Rendering of Tone Values in the Photographic Recording of Sound," by A. C. Hardy, Trans. Soc. M. P. Eng., Vol. XI, No. 31, p. 475, (1927).

A Multiple Synchronous Rewind

TECHNICAL EDITOR

[*Mr. Bergman writes the* CINEMATOGRAPHER *that anyone who may desire to do so is at liberty to copy, build or use this apparatus without obligation of any kind.*—EDITOR'S NOTE.]

Mr. H. W. Bergman, Sound Engineer of the Metropolitan Studios, has devised a multiple rewind which permits the rewinding of three picture films and their corresponding single sound film, while eliminating the possibility of incurring in any error of synchronization of the several records, and they matching to perfection any number of long shots, semi or close-ups pertaining to one single film with one single sound record.

The cutting of the negatives as well as the cutting and editing of the positive prints are extremely facilitated by this ingenious device and the AMERICAN CINEMATOGRAPHER" is grateful to Mr. Bergman for his authorization to make public the specifications for the construction of this very useful apparatus.

The following illustrations and brief outlines of its functioning are more eloquent than any drawn-out, lengthy description of the different parts of the apparatus and of the possibilities it presents.

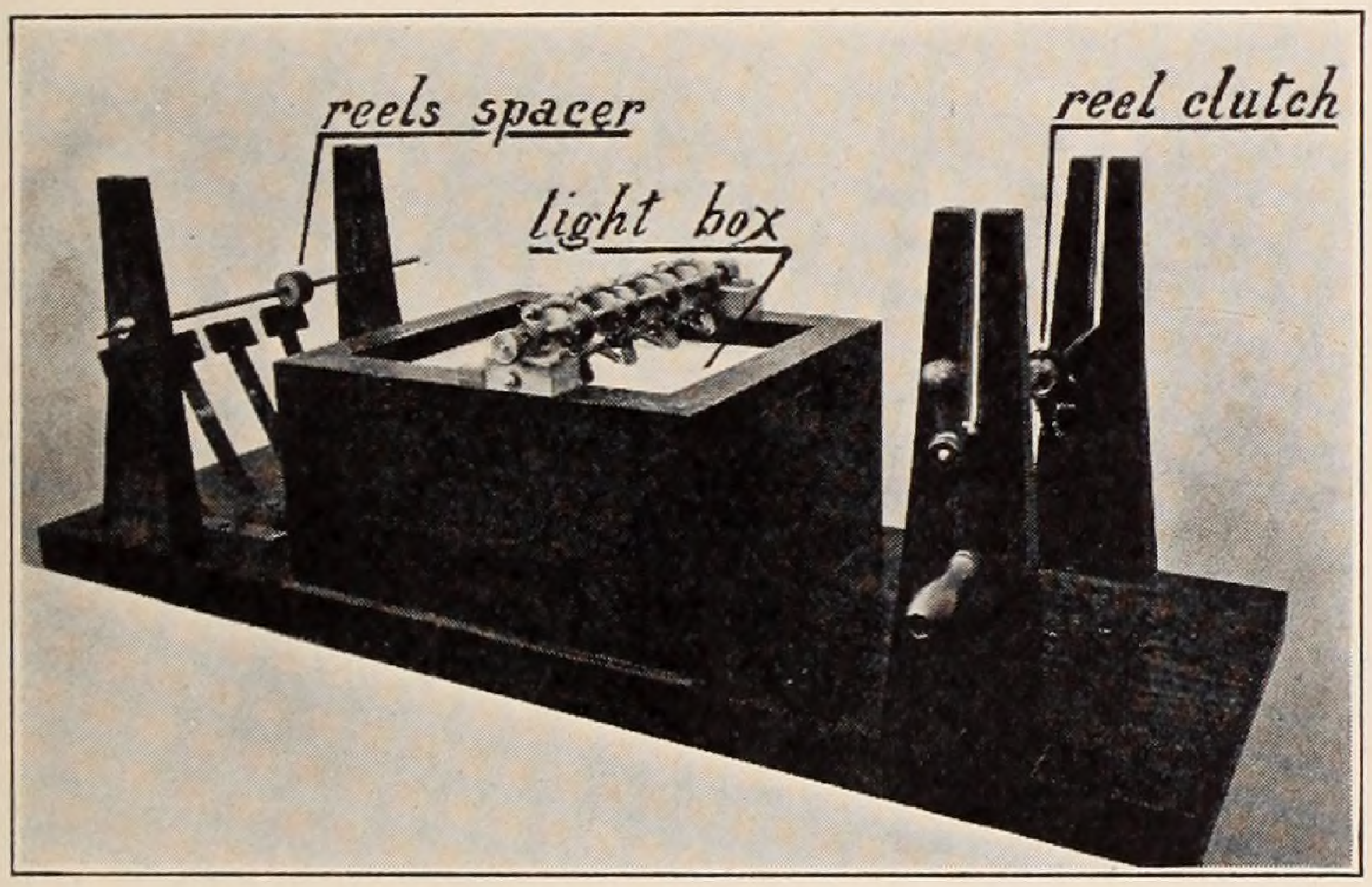

Fig. 1

As seen in the figure, the apparatus mainly consists of one bridge (left side) holding the reels to be rewound, a light-box, a train of carrying sprockets and finally a bridge which holds the reels during rewinding.

First—The supplementary parts of the first bridge are: As many light spring brakes as reels which may be set in position of rewinding. The mission of these brakes is to avoid an unduly rapid unwinding of the film, and

Second—As many reel spacers as necessary to keep the reels and consequently the film, in alignment with the sprockets.

The light-box is of the usual type containing a sufficient number of incandescent light bulbs to transmit a sufficient and even illumination through its opalescent cover.

Figure 2 shows in detail the top of the light-box and the train of sprockets. The four carrying sprockets are fastened to a common axle free to rotate on ball-bearing. **Frame-marks** are engraved on each sprocket and set in perfect alignment.

The punch or fogging marks impressed upon the picture and sound films, permit the perfect alignment of the different records (different picture records pertaining to one single sound record), and in course of rewinding, unwinding and inspection the different records are kept in constant alignment and in perfect synchronization.

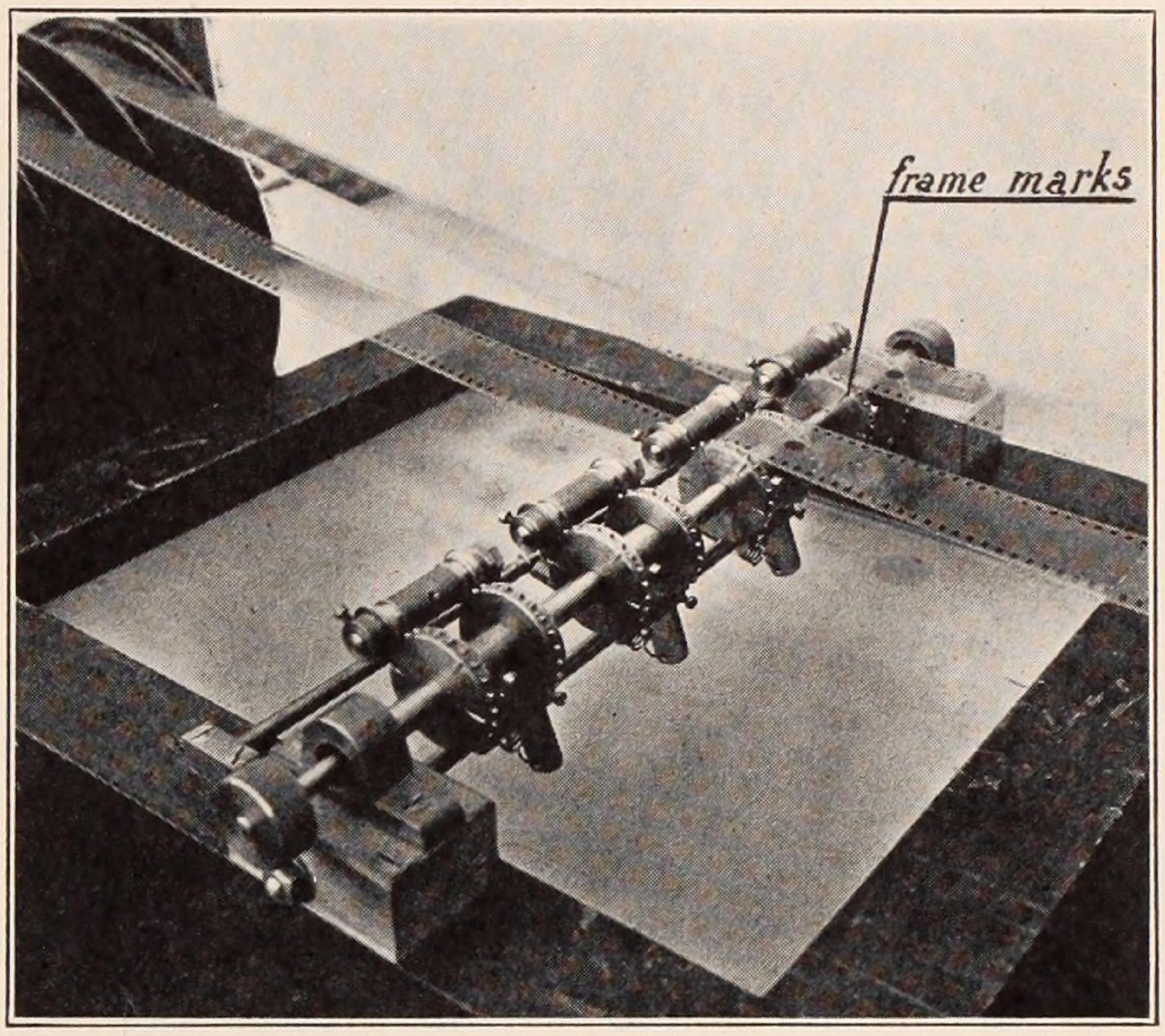

Fig. 2

The pressure of the rollers which hold the film in position on the sprockets is controlled by springs, one end of which is fastened, as shown in the figure, to a stationary rod, while the other end is fastened to a lever which is an intrinsic part of the roller itself.

In the more recent models of the apparatus a driving wheel and handle has been attached to the axle supporting the sprockets at the end nearer the operator, so as to

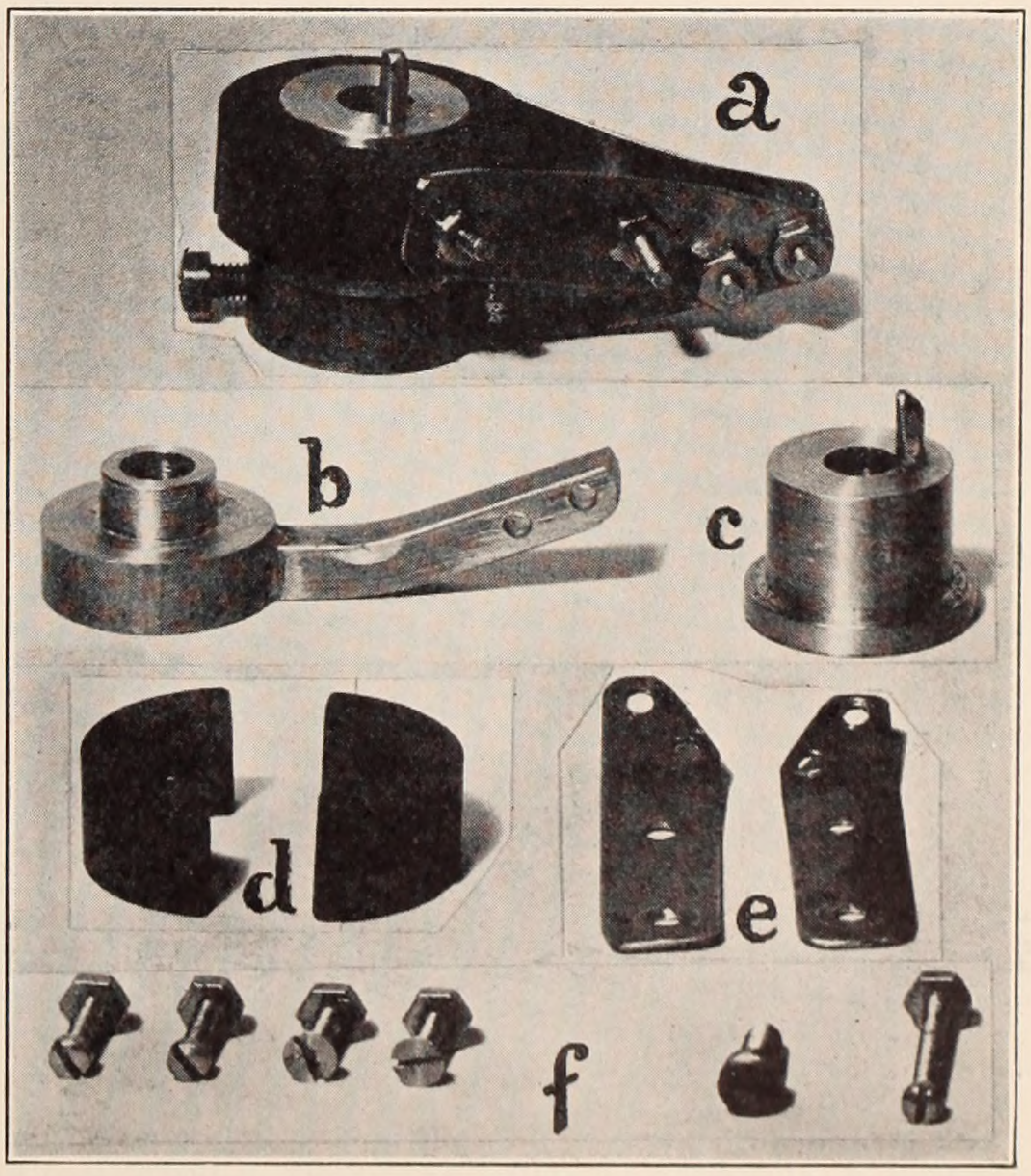

Fig. 3

permit him to unwind and rewind small lengths of film for close inspection.

Referring again to Fig. 1 it will be noticed that a supplementary part of the rewinding bridge, besides the usual handle, is a reel clutch fastened to the axle holding the rewinding reels.

This clutch is, in fact, the most essential part of the whole apparatus. Its function is to maintain a constant tension on the film which is being rewound, irrespective of the size of the film roll.

The clutch also serves to keep the constant separation between reels on the take-up bridge.

Fig. 3 gives a view of the assembled clutch and of its component parts:

(a) Shows the clutch.

(b) Its central core which is held fast to the axle of the rewind by means of a set screw.

(c) A free knob which becomes part of the reel itself when the fixed pin is inserted in the slot of the reel commonly used to hold the reel in any rewinding apparatus.

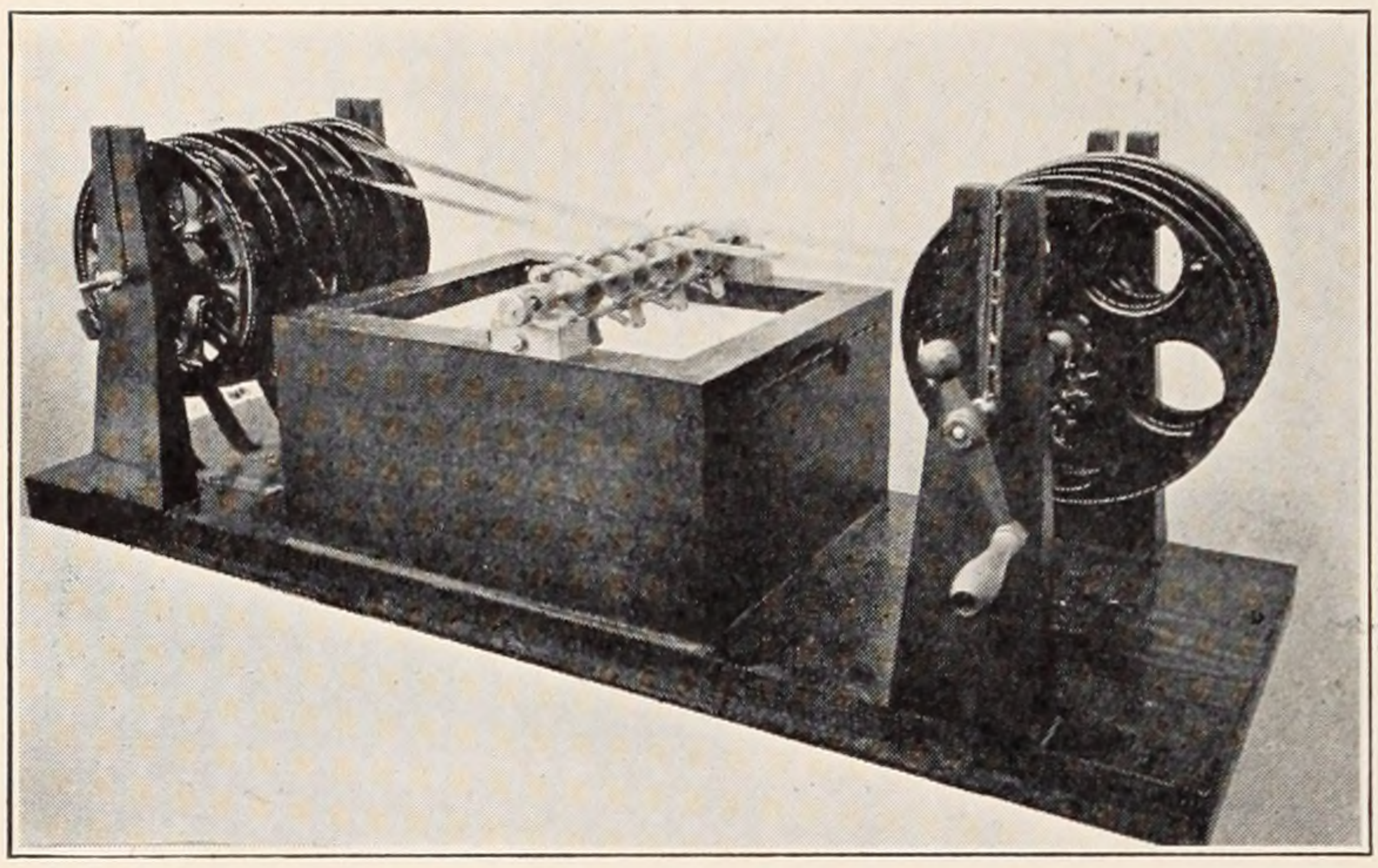

Fig. 4

(d) A split fiber ring.

(e) Two springs fastened at one end to the central core and at the other end to the split fiber ring.

(f) The set of screws necessary to hold the clutch together.

The functioning of the clutch is quite easy to understand. By turning the handle, an impulse is simultaneously given to the rewinding reels, making them turn at a uniform speed.

If one of the reels is holding more film than another, its revolution should be slower in order to keep the frames of the picture to be synchronized in their proper position on the driving sprockets. In such case the fiber ring and springs act as a brake on the free knob, thus reducing the revolving speed of the reel, while the central core makes as many revolutions as there are imparted to the handle and axle.

Fig. 4 presents the rewind complete with reels and two films in position. The four clutches are easily distinguishable.

Once the films are set in the apparatus according to their starting mark, they may be wound and unwound at will without altering the synchronizing position.

Needless to say that the number of driving sprockets is not limited to the four shown in the figures, but can be increased at will. This ingenious apparatus has proven very useful and practical and all film editors and cutters will undoubtedly welcome its appearance.

"Cine-Art News"

"Cine-Art Amateur Movie News," Vol 1, No. 7, is a new Hollywood publication of eight pages devoted to amateur motion picture cinematography and matters appertaining thereto. It is a newsy and skilfully edited periodical and appears to be on the way to a successful career. THE AMERICAN CINEMATOGRAPHER welcomes the newcomer and wishes it a career of great usewulness and prosperity. The **"Cine-Art News"** is distributed by Cine-Art Productions, 6060 Sunset Boulevard, Hollywood.

Hail and Farewell

In the following resolution the Board of Governors of the A. S. C. expressed the sentiments of the Society toward Mr. Joseph A. Dubray, until recently secretary of the A. S. C., who has gone to Chicago to assume the duties of director of technical service with the Bell & Howell Company. The gain of Bell & Howell and Chicago is the loss of Hollywood and the motion picture industry, but THE AMERICAN CINEMATOGRAPHER is happy to note that Mr. Dubray still retains his position as technical editor of the A. S. C. magazine and will be a frequent contributor to its columns. The A. S. C. resolution follows:

J. A. Dubray

A Resolution

WHEREAS, Our brother, Joseph Dubray, has tendered his resignation to the Board of Governors as secretary of the American Society of Cinematographers in order to assume duties in a new field of endeavor far removed from the permanent seat of this Society, be it

RESOLVED: That the A. S. C. accepts Mr. Dubray's resignation with the greatest regret, recognizing as it does his loyal, unselfish and efficient service to this Society and to the motion picture industry in general. A veteran camera master and technical expert in the science of photography, our retiring secretary has ever given freely of his knowledge and skill and has, because of his versatile talents, reflected great honor upon both the A. S. C. and himself.

The A. S. C. therefore, by this resolution, goes on record as placing the stamp of unqualified approval upon our departing brother, recommends him without reserve to his new employers and bespeaks for him unqualified success and boundless prosperity and happiness in his new field.

American Sound-Films on German Device-Tobis Claims For Interchangeability

[*The American Cinematographer has just received this brief announcement from the general secretary of Tobis, the Tonbild-Syndikat, Berlin, Germany. It is evident that America is not alone in sound research as it is related to the cinema.—Editor's Note.*]

Last week the German Tonbild Syndikat Company (Tobis) gave in a Berlin West-end theatre a private demonstration to a number of known cinema experts to show the first time its new unified reproducing device for sound films. This does not need a special projector but consists in a very small and simple attachment which can be installed in a few hours in addition to any usual German cinema-projector, together with amplifiers and loud-speakers specially designed by Tobis, providing an excellent reproduction of speech, music, effects, etc.

The Tobis-device is running usual film of normal width, bearing the sound track inside the sprocket-holes and claims for interchangeability with any English or American sound-on-film system, such as Movietone, Photophone, Cinephone, Phonofilm and so on.

In order to prove that fact, the Tobis company showed, after a number of their own recently-produced sound subjects, three reels of American film, which were reproduced quite clearly.

Tobis is now wiring five big houses in Berlin, Hamburg, Düsseldorf, Leipzig and Munich at a price of a tenth of the Western Electric system, and will continue the installations from February at a rate of fifty sets per month.

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J. E. BRULATOUR, INC.
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Distributors

EASTMAN
MOTION PICTURE FILMS

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Ned Van Buren, A.S.C.

Mr. Gibson's Association Effective
Monday, February Fourth

LOOK TO EASTMAN FOR LEADERSHIP

A Camera for Making Parallax Panoramagrams

By Herbert E. Ives

Reprinted by special permission of Dr. Ives from the Journal of the Optical Society of America.

The name "Parallax Stereogram" was used by Frederic E. Ives to describe the stereoscopic transparency pictures invented by him,[1] in which the two component pictures were present as alternating fine strips, each series of strips visible to a single eye through a grating standing at an appropriate distance in front of the composite picture. The term "Parallax Panoramagram," I use to describe an analogous type of transparency picture, due to C. W. Kanolt,[2] in which in place of two pictures in strip form behind each clear grating space, there is an infinite series of strips, or a **panorama.** As the transparency, with its attached grating, is viewed from different angles, by a single eye, the picture seen through the grating spaces changes continuously, in the same manner that the originally photographed scene would change.

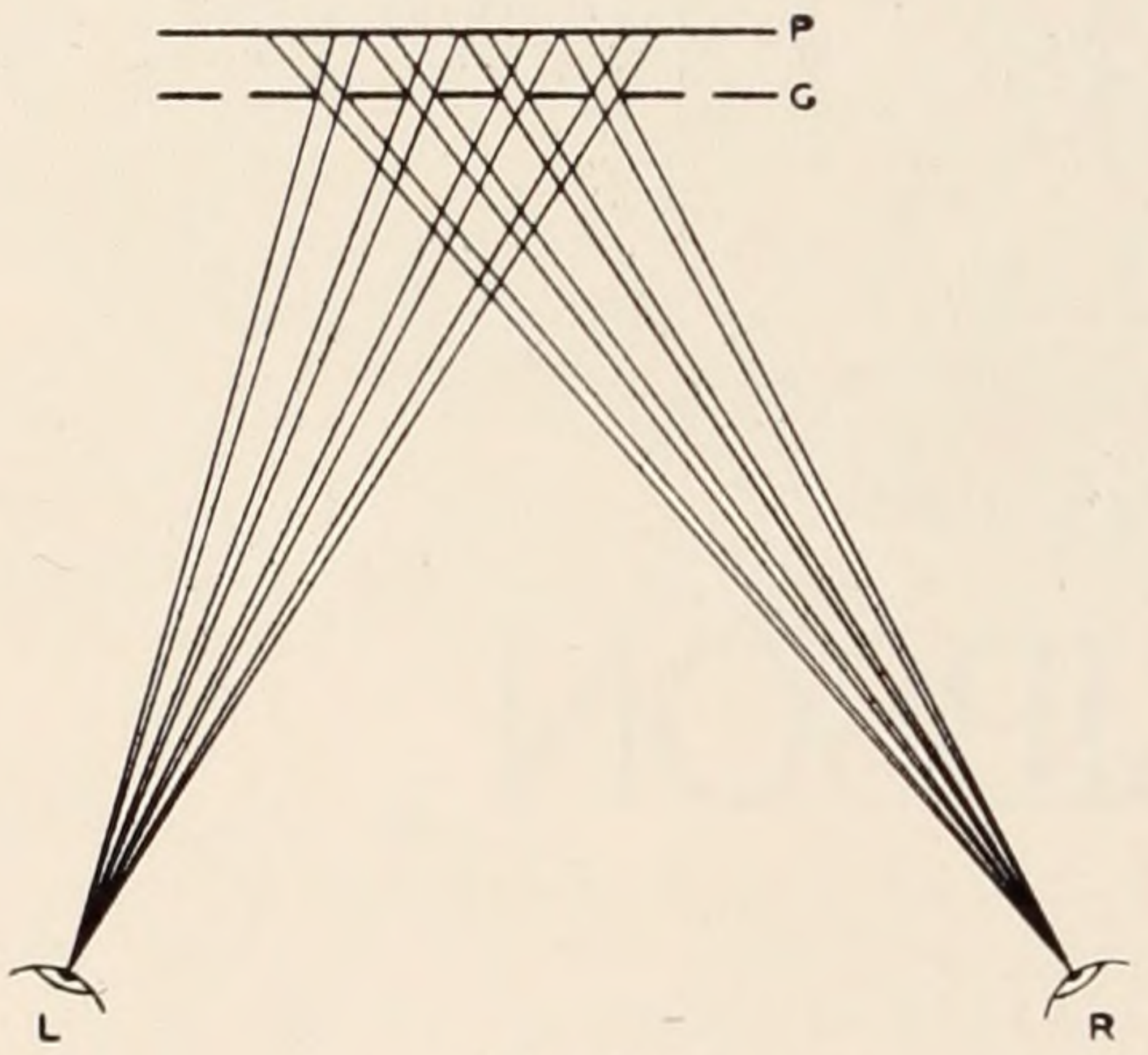

Fig. 1.

Viewed by both eyes a "panoramagram" presents stereoscopic relief, and, unlike the parallax stereogram, which must be held at a definite distance and angle, the panoramagram shows a relief picture at all distances, and at any angle. The purpose of this note is to describe a form of camera for making these pictures; and to record some observations on the results obtained with it.

The problems presented in the design of a camera for this purpose are most easily understood if the characteristics of the final positive picture are described. Consider first the parallax stereogram, as shown in diagrammatic section in Fig. 1. Here R and L represent the two eyes; G, the opaque line grating, in which the clear spaces are approximately half the width of the transparent; P, the positive picture, some distance behind G, and consisting of alternating strips of the right and left eye elements of the stereoscopic pair. A camera for taking the original negative can, quite obviously, be constructed by reversing the light paths, using two lenses, proper care being taken to invert the images, as for instance by the use of roof prisms. Consider next the panoramagram, shown in section in Fig. 2. Here, as before, R and L represent the two eyes, P the positive and G the grating, which is now, however, ruled with a high ratio of opaque to clear space, in order that a small motion of the eyes will expose a new series of infinitesimal strips. At R′ and L′ are shown two new positions of the eyes, at which they each see new views, again forming a stereoscopic pair. If the clear spaces in the grating are narrow enough, and the transparency picture has been properly made in the first place, it is obvious that the eyes may be placed in any position in front of the grating (within limits to be discussed later) and a stereoscopic picture will be seen.

Where the parallax stereogram is made with a pair of lenses the panoramagram is to be made with an infinite number of lenses, or, what amounts to the same thing, **a single lens continuously moved laterally during the exposure.** There are, however, several optical and photographic problems to be gotten around before the apparently simple operation of moving a lens across in front of a grating and plate will yield the kind of negative required. These may be listed as follows: (a) the inversion of the image by the photographic lens, (b) the partial inversion of the image by the photographic printing process, (c) the problem of positioning the image with respect to the plane of the grating, i.e., making an object appear in front of or behind the frame of the picture, (d) the operation of focussing the apparatus after it has been arranged to take care of the other requirements.

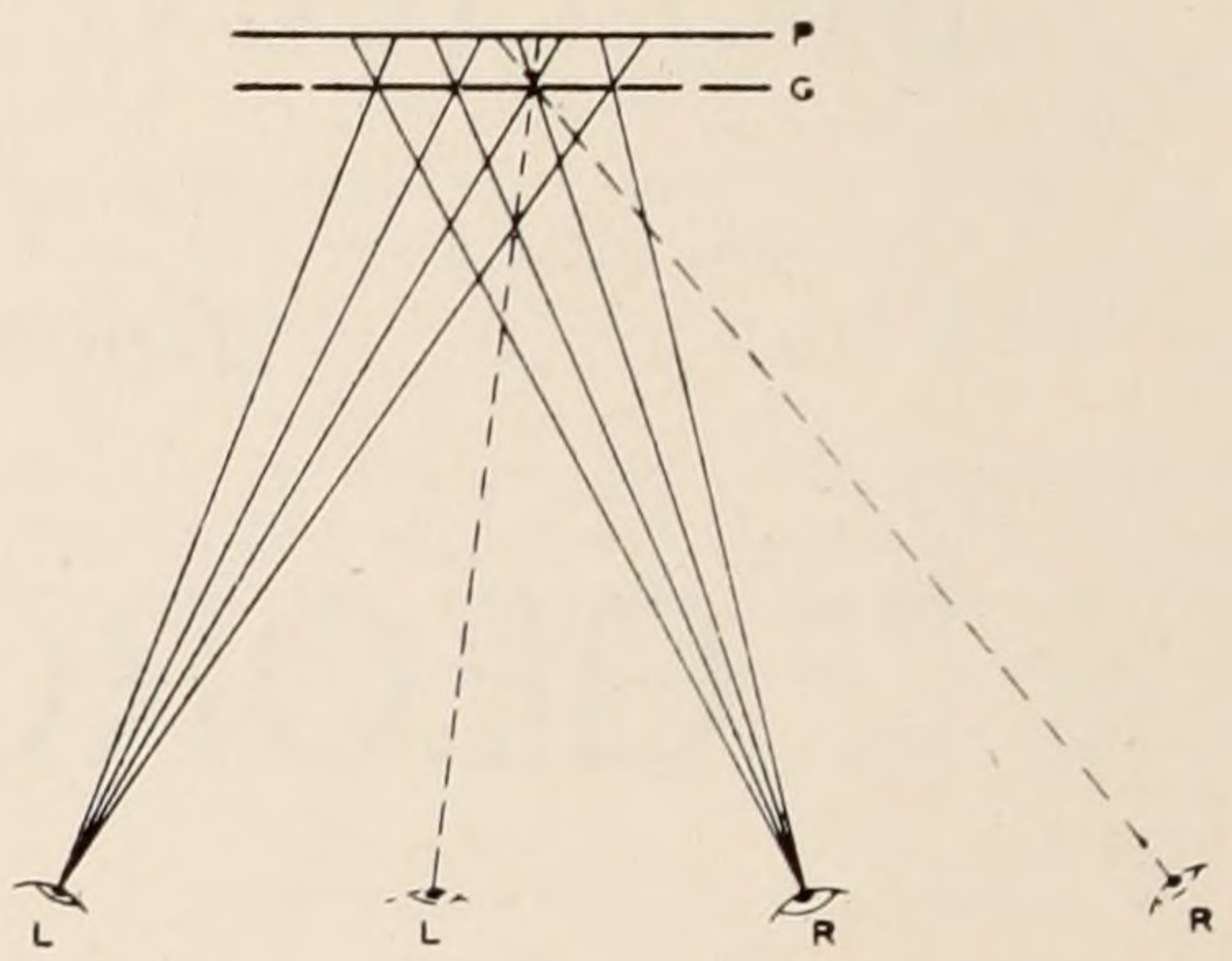

Fig. 2.

Without entering into a discussion of several alternative means by which the several requirements might be met,[3] we may examine at once the final design of camera as worked out, in which all the problems listed above are solved in a comparatively simple way. This is shown in Fig. 3 in a simplified diagrammatic form. The essential feature is that the object (O), the lens (L) and the sensitive plate and grating (S and G), the latter rigidly clamped together (with a thin separator) as a unit in a special plate holder, are kept in line with each other as the lens and plate holder are moved laterally. The requisite motion is produced by having the lens and

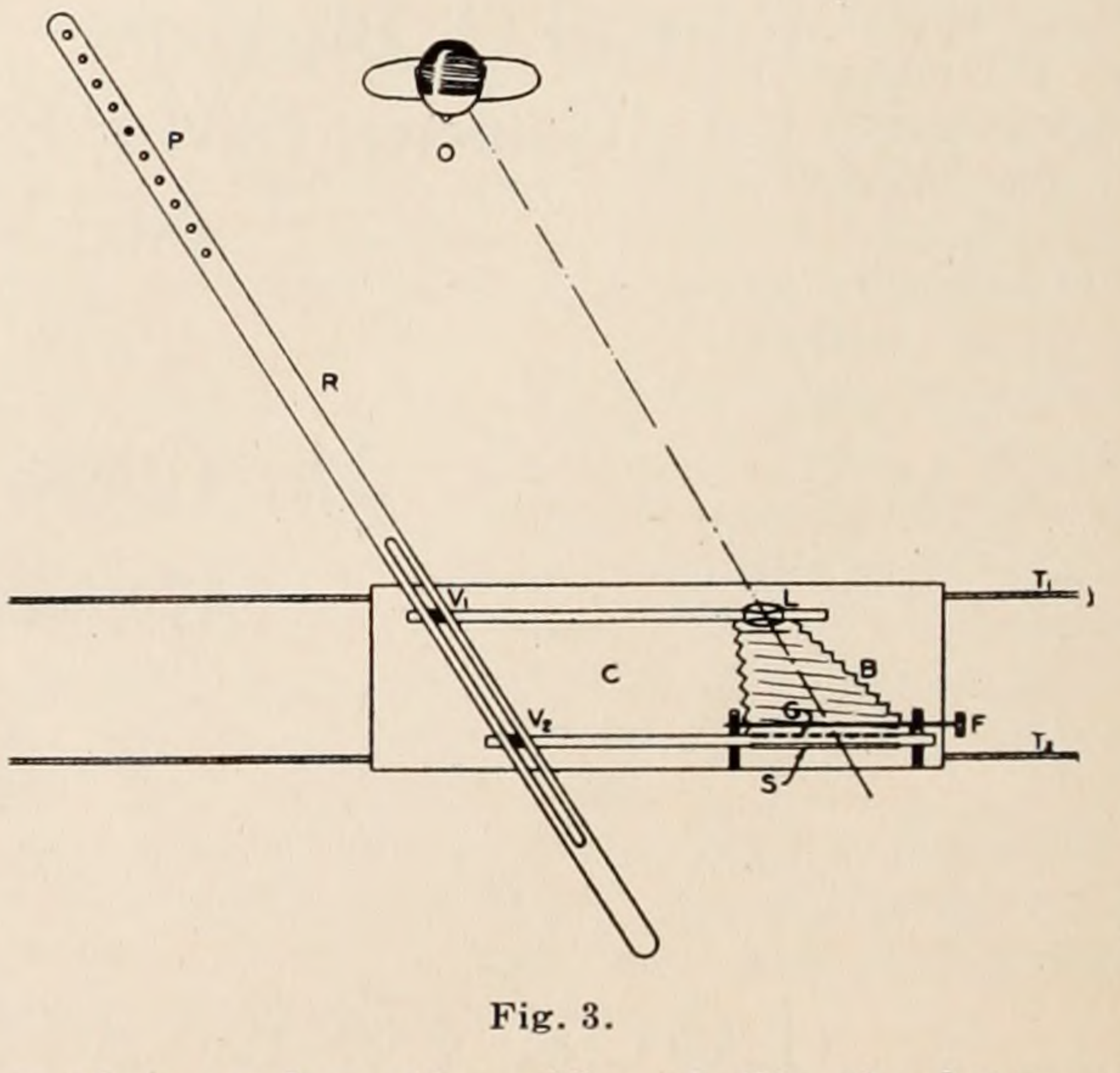

Fig. 3.

plate holder move along a track (T_1T_2) with their relative positions governed by a rod pivoted at the object which is to appear in the plane of the final picture. For obvious reasons of convenience the rod R is pivoted not at the object, but to one side (at P) and the pins (V_1 and V_2), which, sliding in a groove in the rod R, govern the lateral motion of the lens and plate holder, are carried out to the side of the camera body. The camera back, in which the plate holder is inserted, is mounted rigidly as to lateral motion on the carriage C, but is free to move forward and back by the rack and pinion F for focussing purposes, while the lens board is free to move only laterally on the carriage C. A bellows B connects the lens board and camera back.

The operation of the camera is as follows: With the lens at the middle of the track the pivot P is set opposite the portion of the object which is to be in the plane of the final picture, for instance the eyes, if a portrait is to be made. The camera is focused in this position by the rack and pinion F. The carriage C is then moved to one end of the track; the plate holder, containing grating, separator and plate is inserted, the slide drawn, and the carriage set in motion by means of a motor and cog wheel drive (not shown in the figure). As the carriage travels along, the lens moves from one side of the normal to the plate to the other, always keeping on the line between object and plate. When the carriage has reached the other end of the track the lens is capped, the plate removed and developed.

Positive prints made from the negatives produced by this camera are right side up and right way around when viewed through a grating like that used in taking. When the same separator is used between grating and positive as between grating and sensitive plate, and the viewing distance is the distance between taking lens and plate, the picture appears in correct relief at all angles of viewing.

Parallax panoramagrams as made in this way are very striking objects; they have, however, one characteristic limitation due to the finite size of the grating lines. In the experiments with this camera, which made pictures 5x7 inches, the grating had 50 lines to the inch and the ratio of opaque to clear spaces was 10:1. With this size of clear grating lines the definition of objects much in front of or behind the picture plane was poor due to the inevitable overlapping of many images. Much finer clear spaces would have improved this (assuming spreading by diffraction would not have offset the expected finer definition) but at the expense of light, which is already at a premium with the grating used. While this defect is not serious in portraits if the plane of the eyes and mouth is well defined, it becomes so if such objects as machinery or furniture are photographed.

While theoretically the angle through which a panoramagram can be observed can be made as large as desired, it is limited practically in the camera here described by the angular field which the lens L can cover. In the experiments made with the camera the lens used covered approximately 90°. The thickness of the separator between plate and grating was accordingly made approximately half the distance between grating lines. With this arrangement the whole surface of the plate is exposed; the relief picture is visible through 90°, but beyond 45° to the normal the picture starts to repeat itself.

This type of picture will be recognized by students of stereoscopy as intermediate in character between the parallax stereogram and the complete relief picture suggested by Lippmann, consisting of many minute lenses, each forming its own complete image of the scene before the plate. In this latter kind of picture (which would be excessively difficult to realize practically) objects preserve their proper relief and proportion for all positions of the observer. In the panoramagram, while the picture is visible at all distances and angles, only objects in the picture plane preserve their shapes rigidly correct, since the angles subtended in the recticle direction as the viewing distance is changed are to the picture plane and not to the apparent position of the object. This, while a theoretical defect, is not nearly as serious as the loss of definition away from the picture plane, above noted.

I take pleasure in acknowledging my indebtedness to Mr. Carl Percy, for whom this camera was constructed, for leave to describe it at this time.

New York, N. Y.
September 6, 1928.

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[1] U. S. Patent 725,567; 1903.

[2] U. S. Patent, 1,260,682; 1918.

See also, G. Bessiere, Comptes Rendus, 182, p. 208; 1926.

[3] Kanolt and Bessiere describe forms of cameras (loc. cit.). Kanolt moves the sensitive plate with respect to the grating, with which it is in contact, while the whole camera pivots around the object. Bessiere moves the lens, which is provided with a reversing prism, from the normal to one edge of the plate, across the plate, moving the whole camera as well to increase its range. Bessiere's arrangement is fundamentally bettered if a roof prism is used instead of a reversing prism since the lens can then be moved equally far to either side of the normal and the picture is obtained unreversed. Neither of the cameras is in my opinion as elegant or flexible as the one here described.

"Pocket-Size Talkie"

Recently Universal Service carried the following special telegram from New York: Demonstration of an entirely new method of synchronizing sound with motion pictures, using an opaque film with the picture on one side and the sound waves on the other, was made here today by Frederick W. Hochstetter, inventor, of Pittsburgh, Pa.

In place of involved, expensive, mammoth devices, this new invention is so small it can be put into an ordinary pocket. Further than this, it is not necessary to have sound chambers, or perfect quiet to transpose the voice to the film.

Although the feasibility of employing anything other than celluloid film has not been considered before, Mr. Hochstetter explained that, in his opinion, the non-transparent film is much simpler than the transparent.

By a reflection of light upon one side of the opaque film, instead of a projection of light through ordinary celluloid film, the image or picture is thrown upon the screen. At the same time this is going on another ray of light is playing upon the sound waves which have been recorded upon the back of the opaque film.

Hochsetter has also devised a method, using the same idea, for ordinary film. Instead of recording the sound waves on the back of the film, they are caught on the edge of the film.

Patent Process, Inc.

Patents Process, Inc., owner of the Frank Williams, A. S. C., and allied patents, has, THE AMERICAN CINEMATOGRAPHER is informed, optioned its entire holdings to the Halperin Brothers, representing a group of Wall Street bankers, for $5,000,000, the option having now less than sixty days to run. Patents Process, Inc., is a closed corporation officered by Wesley Smith, President; Simeon Aller, Secretary and Treasurer; Frank Williams, Vice-President and General Manager.

THE AMERICAN CINEMATOGRAPHER is informed that the prospective purchaser of Patents Process, Inc., will immediately, if and when the deal is consummated, proceed to construct in Hollywood the largest special process, miniature and research laboratory in the world and which will be the central point of production of all work falling under the several patents controlled by Patents Process, Inc. The new organization will wield a tremendous power in the industry, both as to financial resources and as to its control of the money-saving devices of production.

"Sound Waves"

Editor Cedric Hart is making a success of **"Sound Waves"** at the jump-off. The publication is devoted to "Heralding the epoch of Science in Pictures." **"Sound Waves"** is published at No. 1711 Winona Boulevard, Hollywood. THE AMERICAN CINEMATOGRAPHER bespeaks for **"Sound Waves"** a great future.

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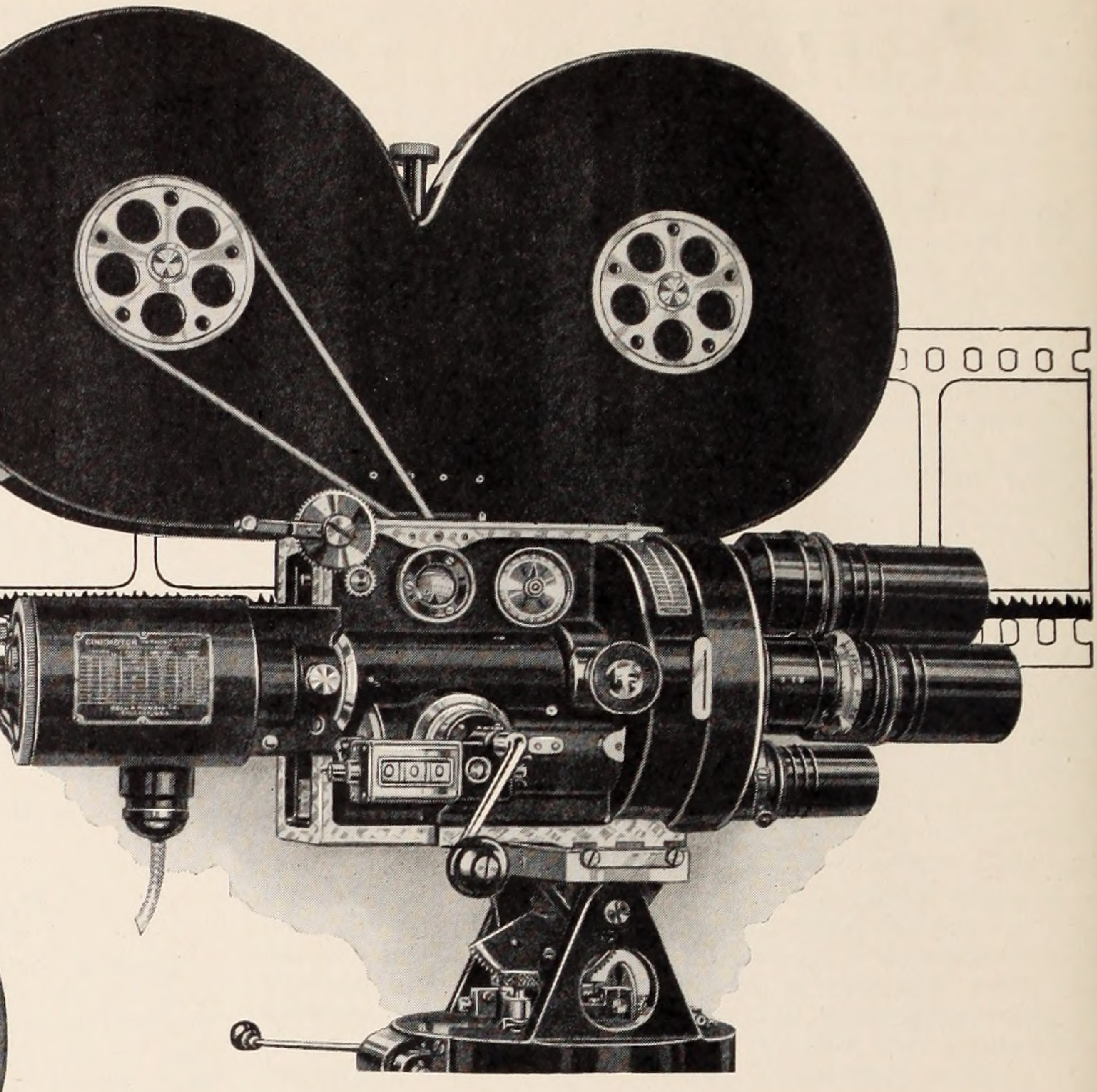
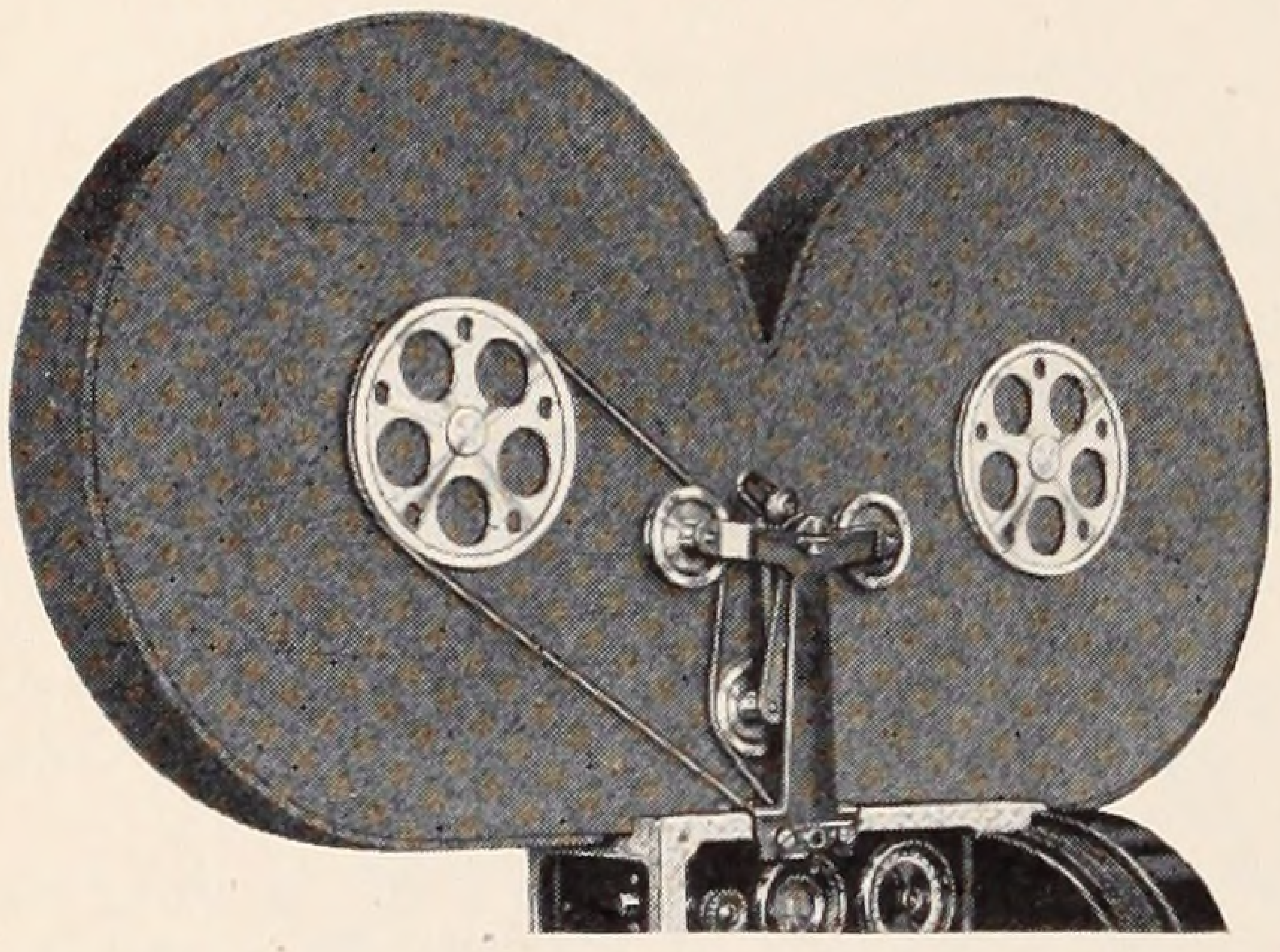


New
Bell & Howell 1000 ft.
Soundproof Magazine
with silent Belt Tightener



SILENT

for sound recording purposes

Bell & Howell sound recording cameras have been made so silent that some studios do not use a soundproof booth in operating them.

With the whole world clamoring for talking movies of the highest order, Bell & Howell standards of camera precision are demanded now as never before. So successful have been the results of Bell & Howell's past six years of research, mechanical refinements and collaboration in the industry that the following leaders now use Bell & Howell silent standard cameras in sound recording work.

Fox-Case Corporation—Producers of Movietone; Hal Roach Studios; Metro-Goldwyn-Mayer; Paramount - Famous - Lasky; Universal Pictures Corporation; Bell Telephone Company; Bristol Company; De Forest Phonofilms, London and U.S.A.; General Electric Company; Powers Cinephone Equipment Corporation; R.C.A. Photophone, Inc.; Western Electric & Mfg. Co.; Westinghouse Electric & Mfg. Company.

A very popular element in "talking movie" production is the new *Bell & Howell 1000 ft. Soundproof Magazine with Silent Belt Tightener for Bell & Howell professional camera, shown above.*

Consultations on standard cameras and silent equipment for sound recording purposes are invited.

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Established 1907

Sound Engineers Confer With M. P. Technicians

By Paul H. Allen, *A. S. C.*

A meeting of the Sound Engineers of the Bell Laboratories and The Society of Motion Picture Engineers (Pacific Coast Section), the Technicians' Branch of the Academy of Motion Picture Arts & Sciences and The American Society of Cinematographers was held in the rooms of the Academy, Roosevelt Hotel, Hollywood, on the evening of January 23, 1929.

The meeting was called to order by J. T. Reed, of the Technical branch of the S. M. P. E., who introduced Mr. John Lyng, Vice-President of the Electrical Research Products, Inc.

Mr. Lyng stated that the Electrical Research Products Corporation is a subsidiary of Western Electric and was organized for the marketing and sales of by-products of the research laboratories. He said that it is a long path from the original experiments of Alexander Graham Bell to the present trans-oceanic telephone from Los Angeles to Berlin. At present radio enters into this hook-up, but it is not a secret that the Bell Telephone system is now building a "loaded" telephone cable which will be laid on the floor of the Atlantic and will give direct phone service by wire to Europe. It was logical for the Bell Company to enter the motion picture business. The Bell Laboratories, a separate corporation, have made a study of sound for fifty years and the transfer of sound waves into electrical waves and return is the basic business of the Bell system of telephony.

Mr. Lyng further stated that in the experiments to analyze speech special devices were developed to measure the minute electrical energy used in the transmission of speech and in the experiments to analyze speech sound equipment was designed to handle. The first type used was the wax disc recording; film recording experiments started early too. This led naturally to the development of electrical recording. The first experiments used the familiar transmitter carbon button, electro-magnetically actuated. Then the question arose, why not synchronize the recordings with film? Crude attempts were made which proved that it was physically practicable. They had two ways to market the electric recording system; one to the motion picture industry and the other through the phonograph industry. The motion picture people didn't accept it at first, though the phonograph manufacturers did. Finally one film manufacturer did, and "quite a nightmare resulted."

Mr. Lyng stated in closing that those present should consider themselves free to ask any questions of a technical nature and which would be gladly answered by Mr. E. C. Wente or Dr. Donald MacKenzie of the Bell Telephone Laboratories.

Director William C. DeMille stated that he was now working on his third sound film, a feature wherein he was trying to devise a new technique in sound film presentation. He stated that too much stress has been put on technical sound recording and that the limitations placed upon the director by the sound engineers have greatly hampered the dramatic development of stories. Mr. DeMille feels that the dramatic development and telling of the story is of first importance, and if anything should suffer it should be the sound record: "For if we have a perfect technical sound record, and a poor picture, there isn't an audience that will go to see technical successes."

Mr. Roy Pomeroy, A. S. C., brought up the question of a temperamental star resenting the appearance of the microphone on the set and stressed the added difficulty of the "mixer" in securing correct recording of the scene.

Dr. Donald MacKenzie answered by stating that after all the microphone was just another added bit of equipment to the already overcrowded stage, and he couldn't see her point of view, though it was perfectly possible to hoist the instrument up out of her range of vision.

Mr. Douglas Shearer, A. S. C., sound engineer with M-G-M, asked when the volume range of the microphone was going to be increased.

Mr. Lyng, in answering, asked the question: "How wide an area do you want?" We are in this business to stay and acknowledge our responsibility, and that the problem is a large one. $1,250,000.00 has been appropriated for experimental work this year. And further promised that a percentage of the profits arising would be placed back in the fund for constant research and experimentation.

Mr. Karl Struss, A. S. C., now engaged in the photographing of Miss Mary Pickford's new picture, "Coquette," outlined some of the problems confronting a cinematographer while making a sound picture.

Mr. J. Boyce Smith, of Inspiration Pictures and Tec-Art Studios, asked: "Do you feel that the problem of sound-proofing of stages is over or under done?" He also asked: "Did you engineers come out here with any preconceived ideas on sound-proof construction based upon your past experience in phonograph record recording rooms?"

Mr. Lyng replied that sound-proofing is to keep noises out, that it is merely a shell constructed over a set to exclude the foreign noises. It wouldn't be exactly correct to hear trolley cars going by if the scene being depicted was supposedly in the center of the Sahara Desert? After the shell is built it must be equipped to destroy reverberation. The resonance must be destroyed. Sound pictures have been made without stage equipment, but the cost of retakes must have been high. The similiarity between phonograph records and sound records ends at the disc itself. In a phonograph recording room the reverberation is correct; but for sound films it is not. When the phonograph record is reproduced in the home the rooms are naturally dead and the resonance of the record is pleasing; but the resonance of the sound film record is furnished by the theatre walls in which it is reproduced. Therefore we record in a live room what we reproduce in a dead room and vice versa. The broadcasting room is constructed on the same basic principle as the record recording room. The two problems are entirely different in the question of acoustics.

Mr. Saville, of the British International Films asked what process was used in "duping" of sound from wax record to wax record after a film had been cut and the necessary sound transferred to a master record.

Mr. Lyng replied that he did not know what method was being used by the Warner Company and that they rightly guarded this process as a secret one. The usual method employed where they desire the sound accompaniment to be on disc records, they first record sound on the film and then after the film is edited and the necessary changes made in the sound track, they then record it on the wax record.

Mr. Fred W. Jackman, A. S. C., famous technical cinematographer and director asked why they were now using several cameras instead of making each individual set-up separate as we have been doing in our silent productions. That inasmuch as the photographic quality of the productions necessarily suffers from the multi-camera methods of production. This question of Mr. Jackman's brought on a heated debate between the sound engineers and cinematographers as to whys and wherefores of sacrificing of photographic quality to the sound track reproduction. After over an hour's many-sided debate, Mr. Jackman asked the chairman if he could consider then that it was entirely up to the director as to whether or not to photograph by the multi-camera method, or to continue with sound film production as we have heretofore. The meeting adjourned at 11:15 p. m.

Composite Photography

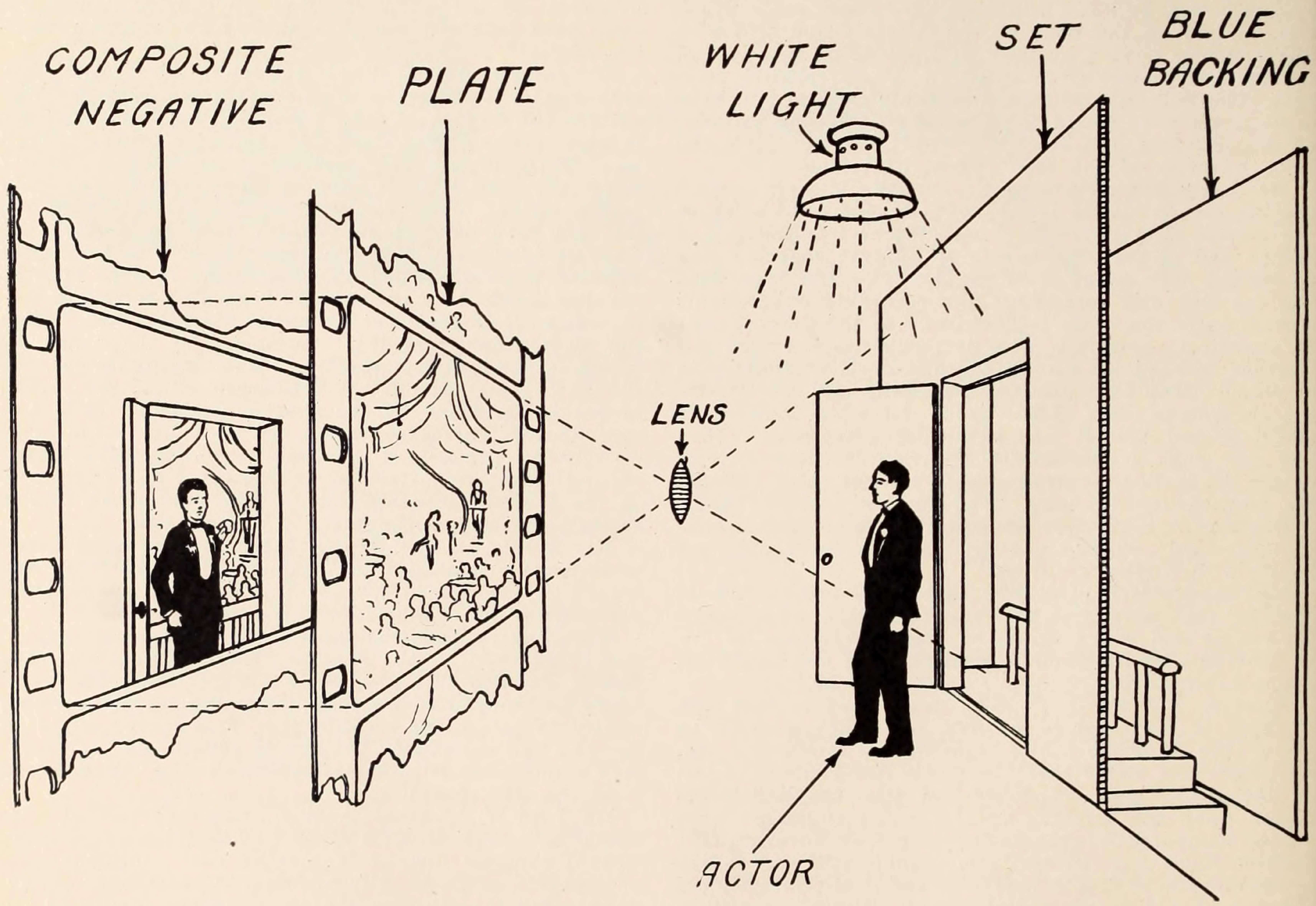
This Article Was Originally Presented at the Fall Convention of the Society of M. P. Engineers Held at Lake Placid, N.Y., Sept. 1928

By C. Dodge Dunning

Of the Dunning Process Co.
Hollywood, Calif.

Composite photography has received marked attention in the motion picture industry. The ability to double-expose actors, without phantom, into miniature action, or into distant location shots, has proven an interesting technical adjunct to motion picture production.

For several years this line of endeavor has been almost entirely confined to methods requiring a mat or silhouette which protected the space to be occupied by the actors in the image area of the background scene. This mat protection was generally introduced during the printing or exposing of the background image and later the negative of the actors who had been photographed in front of a black or white background was printed into the unexposed space previously protected. Patents were issued to Frank D. Williams for a specific method of producing mats, double-printing, etc., and he has done some very successful work for the studios of Hollywood.



Max Handschiegl, now deceased, invented a method of producing a mat by placing a colored background behind his actors and by the use of interposing filters, securing two color separation negatives with contrasting backgrounds, which enabled him to create a mat therefrom. Others have attempted varying means of producing mats. The Schufftan process of German origin, being limited to double exposing two or more pictures on separate sections of an image area, does not come within the scope of this article, which I wish to confine to the are of superimposing, without phantom, by displacing one image for another in any given section of the film area and permitting the free movement of the actors. The Schufftan process as I understand it, confines the action to a pre-determined section and exposes the surrounding background scene into the remainder of the film area simultaneously by means of mirrors or prisms.

Hans Goetz, of Munchen, Germany, secured a British patent in 1921 for use of a colored background and securing simultaneously two exposures through complimentary filters. This patent appears rather basic in character for this particular method of mat making. It was never patented in the United States.

A United States patent for composite photography was issued to Roy Pomeroy on June 12, 1928. The method apparently describes the use of a colored single image transparency, such as blue, made from a background scene which transparency is placed forwardly of an unexposed negative on which is to be photographed a foreground action. Behind the foreground action is a colored wall. The actors are lighted the same color as the single image transparency. The wall is lighted in a color complementary to the transparency and complementary to the foreground action. He makes provision for the uneven photographic density of his blue transparency to

Concluded on Page 16

Clarence Brown, directing LEWIS STONE *and Dorothy Sebastian in a scene from the new Metro-Goldwyn-Mayer picture, "A Woman of Affairs"*

PUT CARBONS ON YOUR CAST

NATIONAL Photographic Carbons maintain an even balance of light and shade between actors and walls of set because their light has penetrating power equaled by no other form of studio lighting. Light struck from these carbons permits flexibility in illumination.

For night work National White Flame Photographic Carbons (hard light) will give light identical to sunlight. For a given amount of illumination, a minimum of power is required.

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Experts Choose
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Which makes it of great significance that the expert cinematographers choose the DeVry Standard Automatic for exacting work of this character.

Pictured here are cuttings from a negative of wild life recently made by George E. Hayes, of MGM and International Newsreels, at the famous Gay Lion Farm, El Monte, California. Mr. Hayes was within three feet of the monster alligator when he obtained this superb photograph of the cavernous jaws.

The dependable DeVry assures perfect pictures every time. Just point the camera and press the button. Capacity is 100 feet of standard 35 mm. film which may be used on any standard projector, or reduced for 16 mm. projectors.

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blue light by using a separate negative transparency of the same scene, which is dyed in an intermediate color.

A United States patent was issued to me January 2, 1927, for a process of composite photography which has entirely eliminated the use or need for a silhouette, or protecting mat. Having spent several years prior to patent issuance in developing this process, I am in a position to discuss it more comprehensively.

An original negative of a background scene is furnished me by a motion picture producer. Whether it was made from a miniature, a high speed shot containing action, or a stock library shot, is immaterial. From this a double image transparent print is made containing a positive image of a certain color, say red, and a negative image of a neutral shade, say gray. By successive tests, we ascertain the kind of a double image print which when exposed forwardly of an unexposed panchromatic negative to an approximately white light, will equally fog the negative. It is absolutely essential that this two-image print be of equal photographic density to panchromatic stock as will be seen shortly.

This double-image print is then loaded into an intermediate magazine on the camera which is to photograph the foreground action and is threaded across the aperture in front of and in contact with the unexposed panchromatic negative. Behind the actors or foreground set, is a blue background.

By lighting this foreground action with an approximately white light or a light which is neutral to both colors of the transparent print, this double-image print becomes nothing more to the action than an evenly balanced filter wedge and therefore does not present an uneven obstruction which would cause phantom. Simultaneously with the photographing of the foreground action, the unobstructed blue area back of the actors is acting as a printing light for those sections of the scene on the double-image print, which are not occupied by the photographed action.

The result is a completed composite negative which is developed in the usual manner and exhibition prints made therefrom along with the regular work in any commercial laboratory. In all cases the producer sees the finished results on the screen the next morning, when he is reviewing the "rushes" of the previous day.

We have just finished double-exposing a series of battle scenes where the plate or double-image transparency, was made from a negative showing the enemy fleet in action, taken with a high speed camera; the enemy fleet comprising an array of twenty-seven miniature frigates on a four-acre lake. Into this we double exposed foreground action, life size, showing the deck, cannon fire, etc., of the hero's flagship. Unfortunately we are not permitted to exhibit this work prior to the public release of this big feature production.

This process of double exposure finds a very practical use in connection with sound pictures. In cases where the foreground action presents dialogue in a presumably remote or difficult location, the latter is previously "shot" in silence and doubled into the action shot taken on the sound-proof stage. In other cases, such as a cabaret scene, the foreground dialogue is recorded on the sound-proof stage, while the music and chatter of the cabaret is introduced synthetically only when the door is opened. Another illustration is the "close-up" conversation of Douglas McLean and the girl, doubled into a silent street, whose noises are afterwards placed so as not to interfere with the conversation.

This shot, to be made in the regular way, would have required an elaborate traveling sound recording equipment, as well as expensive generator trucks and other moving illuminating paraphernalia. As shown in the demonstration it was "shot" on the studio stage in a very small space and the previously taken street panorama in motion was doubled in simultaneously.

Visual Education

Mussolini and the League of Nations Lead the Way in a World Movement to Fight Ignorance With Films—A.S.C. Has Idea

By Joseph Dubray, *A.S.C.*

This is the story of how the conservative Old Country forges away ahead of the ultra progressive United States in a matter which not only is of international importance, but which marks one of the greatest evolutionary steps in the history of mankind. In a well documented article due to the pen of Mr. Michel Coissac, editor of the French magazine, "Le Cineopse," we read: "At the International Convention of the Cinema, held in Paris from September 26 to October 3, 1926, the third committee, which was intrusted with the investigation of all matters pertaining to visual education through motion pictures, provoked from the convention a vote of approval on not less than thirty-five articles which had been carefully studied and discussed by the committee.

"Article 14 proposed that **an International Bureau of Visual Education through motion pictures be established,** that it be directly affiliated with the League of Nations and that **its members be drafted among technicians and specialists of the cinema of recognized ability."**

One of the missions of the bureau was to prepare an analytic catalogue of all the films in existence which are susceptible of being used for the purpose of visual education.

One year later, September 6, 1927, at the third general meeting of the League of Nations, held at Geneva, Senator Cippico, in the name of the Italian Government, declared that his government was fully aware of the importance of motion pictures as a medium for the advancement of education, and judging that **"the industrial world itself does not consider motion pictures solely as a speculative medium, but also has a real vision of their power as a medium both dignified and practical for attaining a lofty ideal,"** it had decided to **"propose the creation of an International Institute of the Educational Cinema which should have its seat in Rome and which, according to Article 24 of the agreement, should be placed under the jurisdiction of the League of Nations."**

"To this effect the Italian Government offers not only the necessary funds for the organization as well as the maintainance of such institute, but also to provide for it headquarter offices in the historic Palace of the Stamperia in Rome."

"It will thus be possible for all nations to participate in the creation of the Institute with equality and freedom of action and without financial problems of their own nor charges on the budget of the League of Nations."

Such generous offer was accepted by the League of Nations, and the Italian offer was further confirmed by a letter from Premier Mussolini, dated January 7th, 1928, in which the "Duce" stated that his government:

"Pledged itself to create and maintain an Institute of the Cinema for visual education which would be placed under the jurisdiction of the League of Nations and the seat of which would be in Rome."

The Italian legislature approved of a budget of 600,000 lire per year for a period of ten years towards the covering of the expenditures of maintenance. This was subsequently ratified by Royal Decree No. 2480 of September the 6th, 1928.

It was also tacitly understood that this period of ten years may be extended for subsequent periods of ten years each.

Finally the Italian Government with another noble gesture decided that the Palace of the Stamperia would be inadequate to the needs of the Institute and offered the magnificent Villa Falconieri, at Frascati, near Rome, for the purpose.

On November 5th, 1928, in the presence of His Majesty the King of Italy, of Mr. Mussolini and of dignitaries and representatives of the Nations members of the League of Nations, the **Villa Falconieri** was officially presented to the League.

In his speech of remittance, Mr. Mussolini said:

"There are, among other thousands, three discoveries each one of which mark a new era in the history of civilization—the discovery of the printing type, invented in the middle of the fifteenth century; the discovery of the camera oscura a century later, and finally the invention of motion pictures.

"These discoveries represent three fundamental steps in the progress of human thought. They are three formidable instruments for the conquest and dissemination of culture.

"Motion pictures, which are as yet in their first period of development, present over the book the great advantage that they speak to the eye, that is to say, speak a language known by all nations on earth. From this they derive a universal appeal and offer innumerable possibilities for educational co-operation of an international character."

While the motion picture industry in the United States was developing and giving tremendous impulse to the cinema solely as a **speculative medium,** as Senator Cippico has expressed it, the European countries, in spite of their less sound financial resources, in spite of frontiers and diplomatic difficulties, in spite of the differences of languages, costumes, traditions, could find sufficient spirit of initiative to come to an understanding for the common good and to **ACT,** setting thus a remarkable example before the world and proclaiming that **education knows no boundaries.**

The fact that the United States has not joined the League of Nations is of secondary importance, and becomes immaterial when the moral welfare of humanity is at stake. In fact the United States not only has a seat at the League as an interested and sympathetic observer, but this Nation contributes to the universal brotherhood by taking an active part in matters outside European diplomacy and politics as is proven by the fact that Professor Millikan, of Pasadena, has a seat in the League's council, created for the promotion and advancement of science.

The United States can and should co-operate with the International Institute of the Educational Cinema and to this end **it should first create a similar national institute for the purpose of co-ordinating and organizing within its own territory the systematic development of this extremely logical medium of education.**

The educational bodies of the United States have been for the past few years greatly interested in this matter and some of the universities, as Columbia, Yale, Harvard, the Universities of California and of Southern California and others have already devoted efforts and energy in a sincere attempt to give the cinema the place that is due it in the great educational scheme of the country.

Private enterprises have also followed the same path. First among all the Eastman Kodak Company is, with the co-operation of some of our greatest educators, liberally, unselfishly devoting time and capital to a systematic spread of the educational cinema.

All these efforts have nevertheless been more or less the efforts of individuals, all tending to the same finite scope and they suffer for the lack of that co-ordination which is essential in any motion picture enterprise.

Success of motion pictures depends entirely upon three fundamental factors which we may call the three KNOWS of the cinema:

Know WHAT to do.
Know HOW to do it.

Know HOW to DISTRIBUTE what you have done.

Motion pictures, whether they are made for entertainment, for education or for any other purpose, are a costly affair.

The WHAT to do can only be determined through the consensus of opinion of educators.

The HOW to do it can only be determined through the co-operation of these same educators and the experienced technicians of the screen.

The how to DISTRIBUTE the pictures once made can only be organized through the experience acquired by producers and distributors of pictures made for entertainment.

The producers, distributors and technicians of the screen have learned in the hard school of experience how to make pictures and how to make them serve their purpose through widespread and systematic distribution.

A nation-wide fusion of educators, technicians, producers and distributors is essential to the success of an institute of visual education.

If we consider the cold financial problems involved in such a project we find that philanthropists may generously endow with large sums an institute of visual education. The Government itself might be prevailed upon to subsidize this essential of modern civilization, but no matter how large may be the sums derived from these resources they would not suffice to guarantee a systematic and proper continuance and wide distribution of the films that may be made.

Films made for the purpose of visual education should be self-sustaining and, although philanthropic donations and subsidies from the Government and educational institutions would permit the organization of an institution and the making of films presenting onerous difficulties in their preparation, the general distribution of these films should be organized and systematized as a non-profit, but highly efficient, **business organization.**

All the problems, be they of an organizing, technical or economic nature should be met and discussed by qualified people or groups of people possessing a spirit of friendly co-operation and a high consciousness of civic responsibility.

The "American Society of Cinematographers," conscious of the importance and the need of a movement for the purpose of definitely establishing in the United States the use of motion pictures in the educational field, advocates that a NATIONAL CONVENTION be held at the earliest possible date for the purpose of deciding upon the course to be taken in order to bring about the necessary co-operation of individuals and bodies as outlined in this article.

That the universities of the country be invited to send representatives to this convention.

That the Motion Pictures Producers and Distributors of America (Will Hays' organization), the Hollywood Association of Motion Pictures Producers, the Academy of Motion Picture Arts and Sciences, the American Society of Cinematographers, the Eastman Kodak Company, and the Government of the United States make all efforts to be represented by qualified members and representatives.

At this convention three special committees should be appointed whose duties should be to discuss and to recommend the procedures inherent to the educational, the technical and the economic aspects of the Institute. The committees should be afforded all facilities for meeting and should form the nucleus of the directing bureau of the proposed Institute. The chairmen of the committees should, at an appointed date, meet to correlate the findings of each committee and recommend their practical application.

From such convention and through the organized efforts of the special committees, an institute of visual education could be organized in a relatively short span of time, be assured of the good will of the Nation, and prove the beginning of a long and honorable career.

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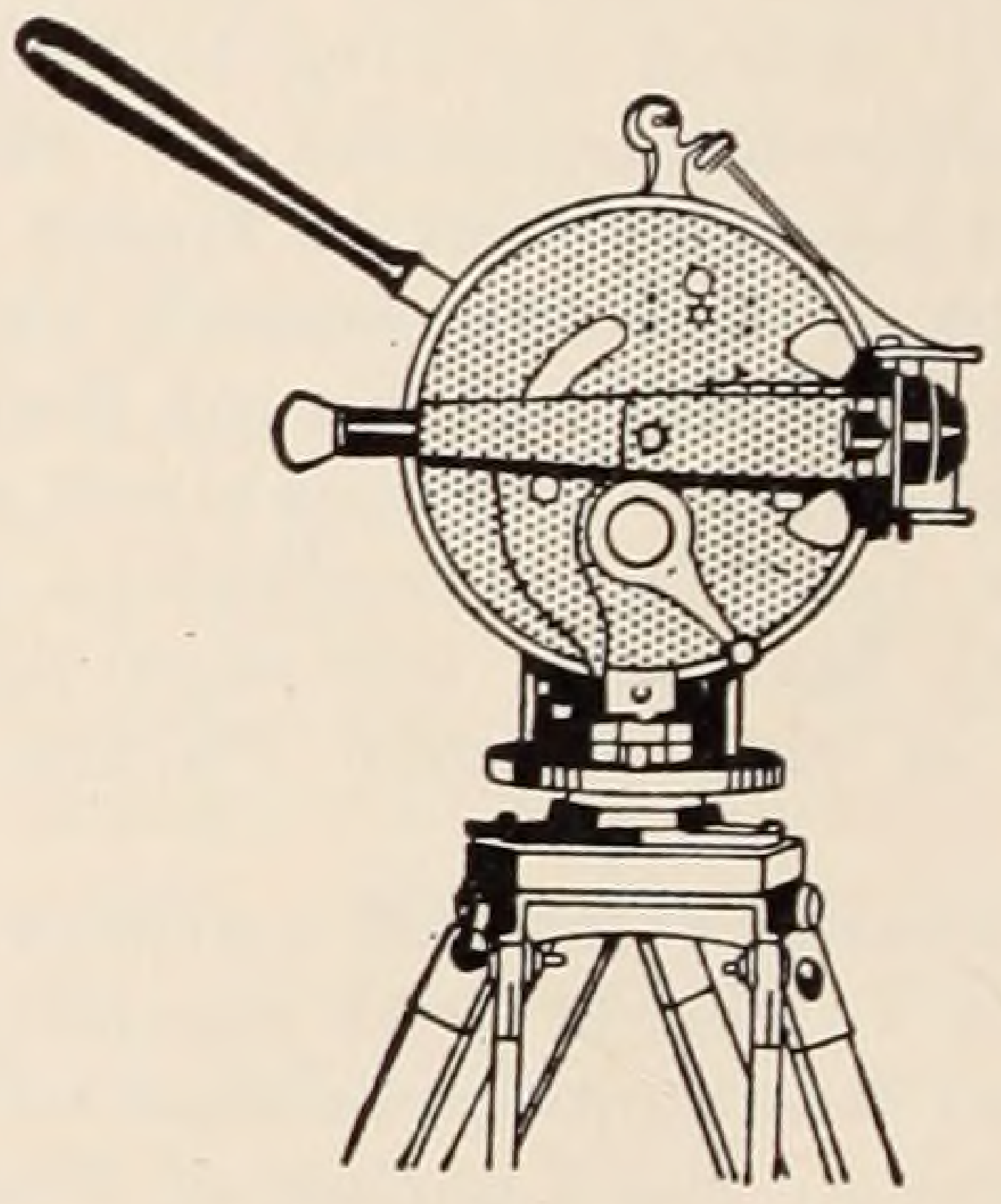

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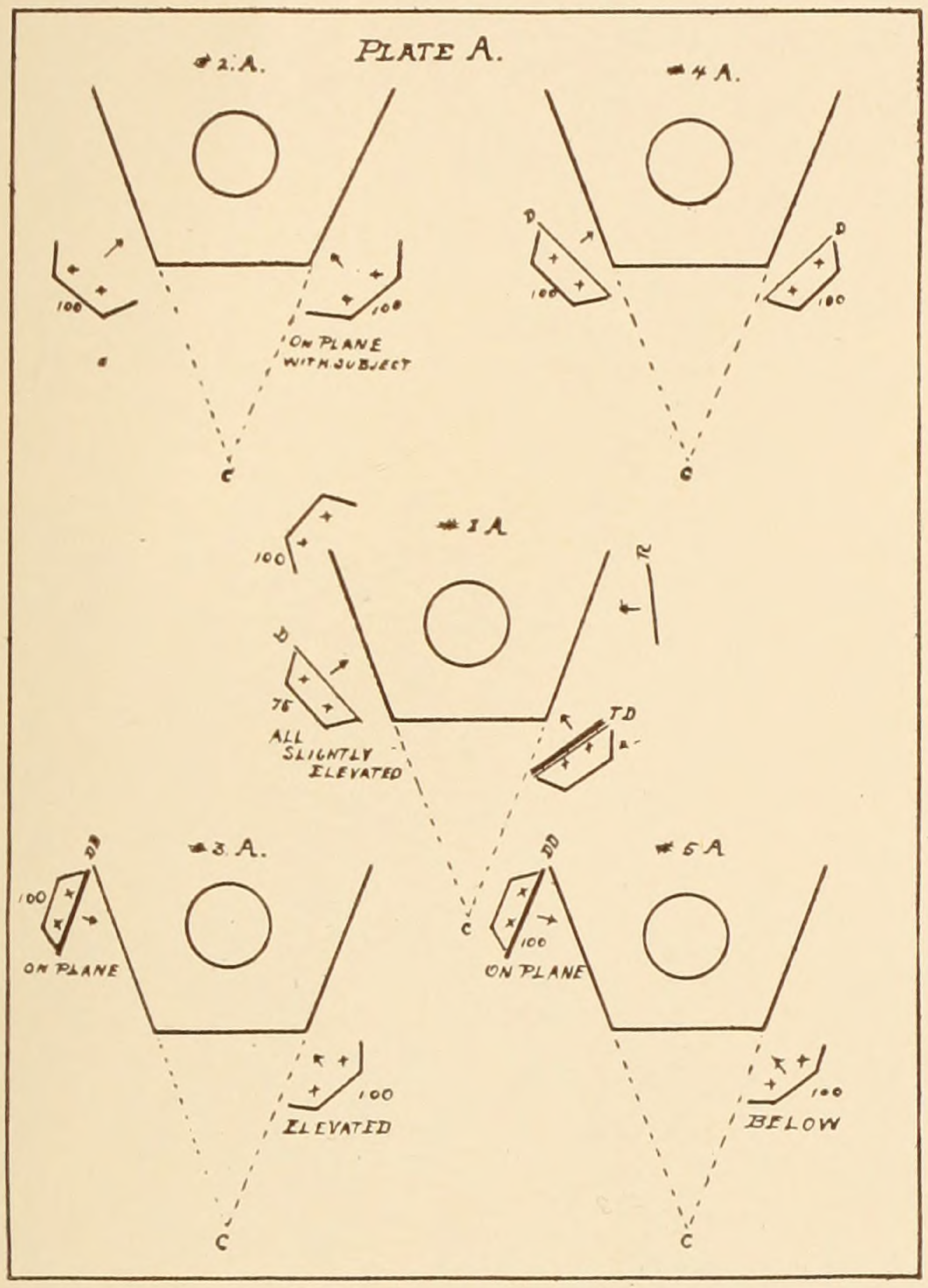
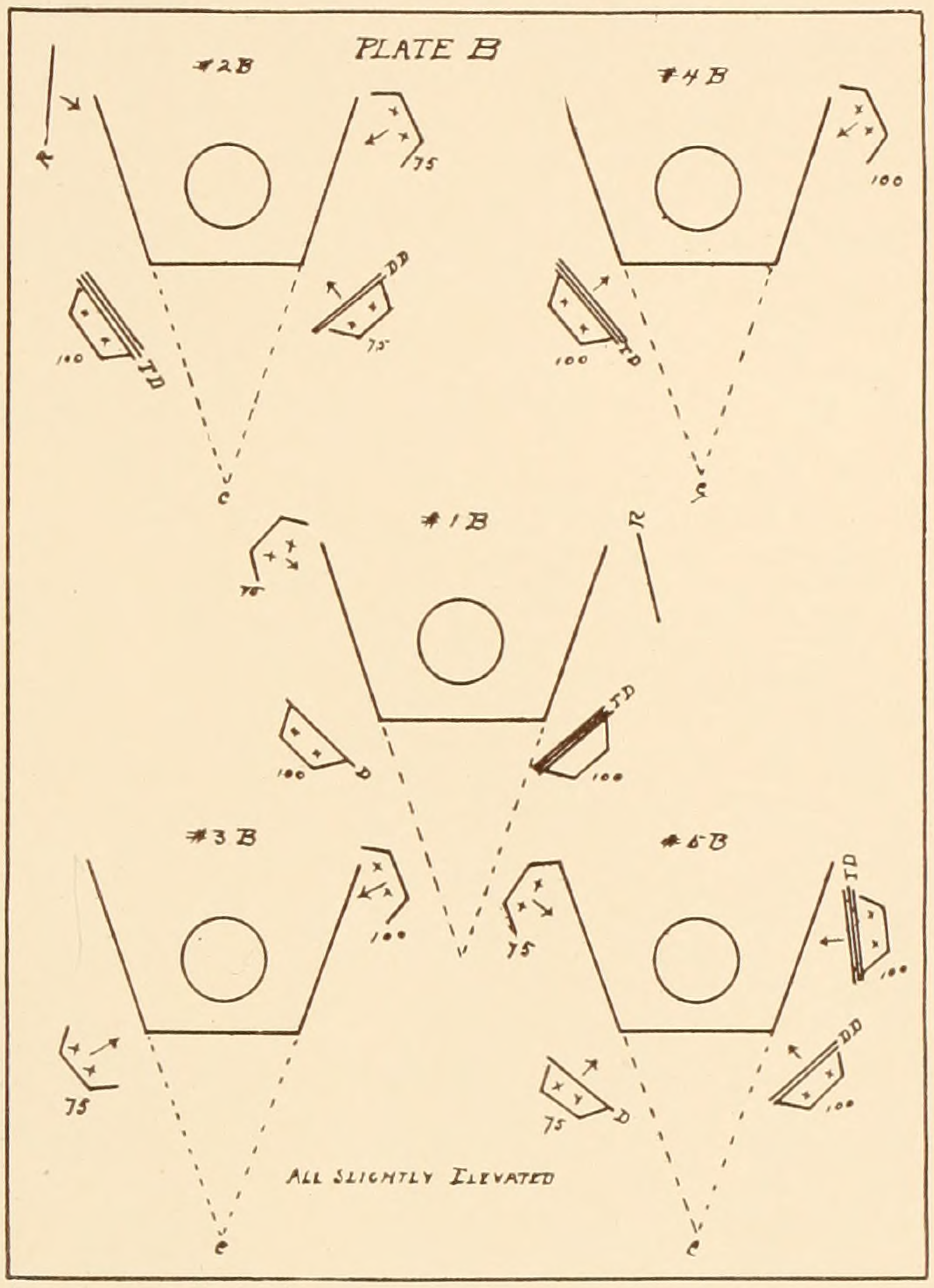
[*In the* American Cinematographer *of January, 1928, there appeared an article by Mr. Louis W. Physioc, of Hollywood, entitled "Does the Camera Lie." A feature of this article was the double truck cut composed of shots of the head of the Venus de Milo, which cut is reproduced in this issue. In the* Cinematographer, *of January, 1928, two plates, explanatory of the ten photographs of the Venus head, were omitted by mistake and the force of the article was thus greatly impaired. These two plates, showing the ground plans for the arrangement of the lamps to light the various shots, have been found and are here printed in connection with the double truck and with that part of Mr. Physioc's article which is explanatory of the lighting equipment and the proper placing of the units to secure the lighting effects as demonstrated in the various shots. See double truck pages 20 and 21.—Editor's Note.*]





". . . . . . With the aid of modern lenses and panchromatic film we are looking forward to the time when some one will be bold enough to make some experiments with matt surface reflectors as the basic source of light, especially for close-up work, in lieu of direct lighting. Surely we have been given sufficient hints of the value of indirect lighting.

For the benefit of those who still believe that to preserve their beauty, it is necessary to burn out the blemishes with a blaze of light, it is our humble opinion that there is more security in Dryden's ancient lines, as true now as when he wrote them:

> *"'Tis every painter's art to hide from sight*
> *and cast in shades what seen would not delight."*

Plate A.

In the accompanying cuts, Plate A shows various treatments of the full face, and we may learn something by studying each individually:

No. 2 A. Shows the lovely Venus transformed into a stupid, gross featured, flat nosed, blear-eyed individual. Note the ugly cast shadows, from the nose, across the cheeks; and also, how well defined are the imperfections on the surface of the model. This effect is achieved by the popular burn-up method of throwing strong, open arcs, at the same angle, across the face. The whole is flat and uninteresting.

No. 4 A. Is a similar effect, except that the photographer has thought to help the situation a little by diffusing the light. However, it is still flat and uninteresting, due to too even a distribution of light. See how broad is the bridge of the nose, the eyes still dull and stupid, the mouth thick lipped and sensual and the surface of the face blotchy.

No. 3 A. Is more engaging, but is harsh and contrasty, and tends to destroy feminine delicacy by suggesting more an Adonis that a Venus. Observe the square, sharp cut effect of the nose and eye sockets. However, the eyes begin to assume a little expression—they are enveloped in shadow and the imagination comes to the aid of the plaster Venus. But study the surface—there is no disguising the fact that she is nothing more than cold, hard plaster.

No. 5 A. Here, the photographer has attempted to burn out a little fullness under the chin that seems not to have worried Venus, but annoys some of the present beauties. This method may accomplish its design, but see what else has happened—it makes Venus' right cheek appear inflamed with the tooth ache and her expression gives evidence of the pain—her eyes are rolling up in her head and her nostrils are twitching in her paroxysm.

No. 1 A. Shows the ideal system of lighting. All the features are softly rounded and modeled. The lovely work of this ancient and unknown sculptor is preserved and reproduced in all its feminine delicacy and charm. Compare the beauty of the lips and the sweetness of their expression to the other reproductions. Study the dainty

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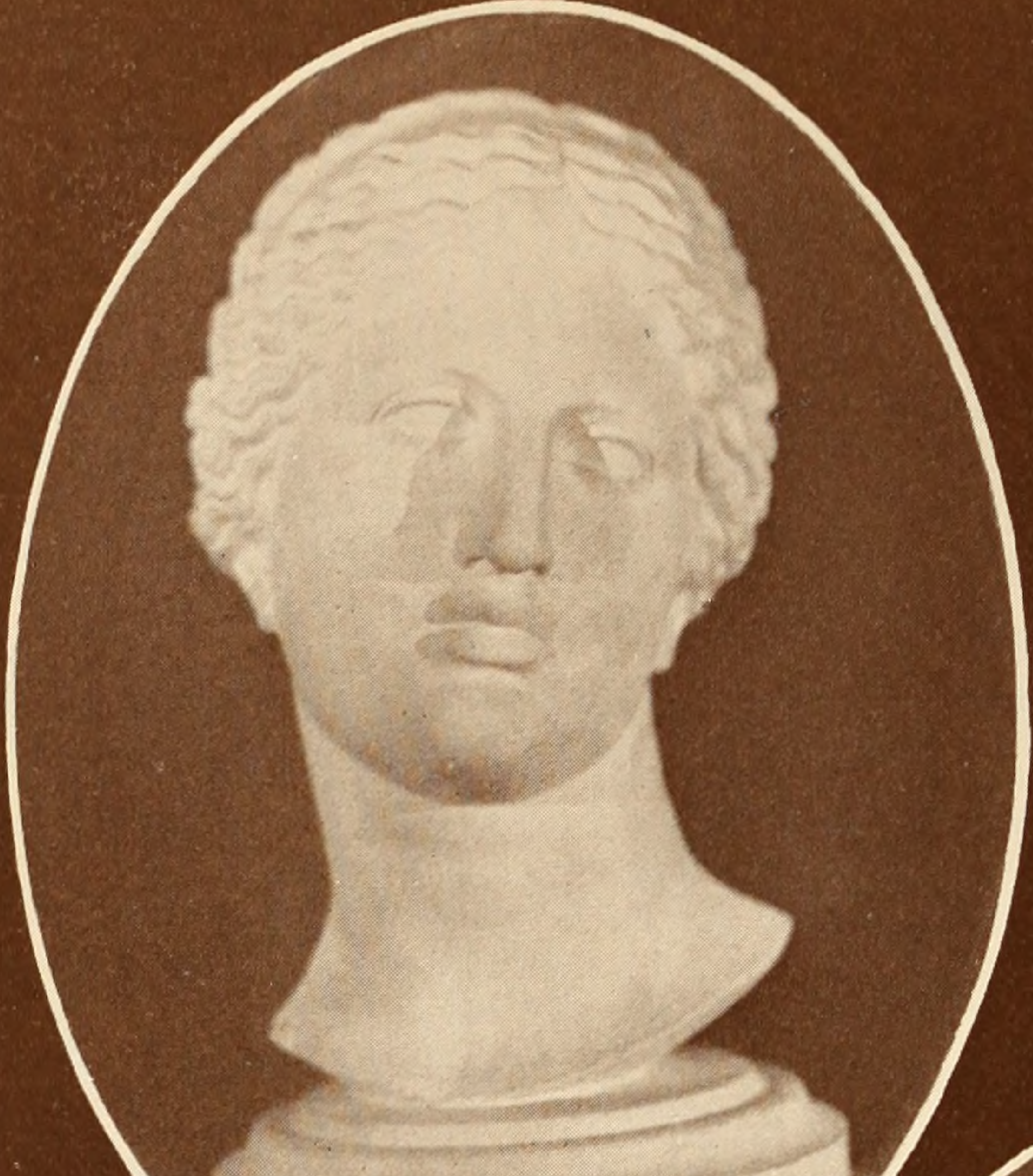

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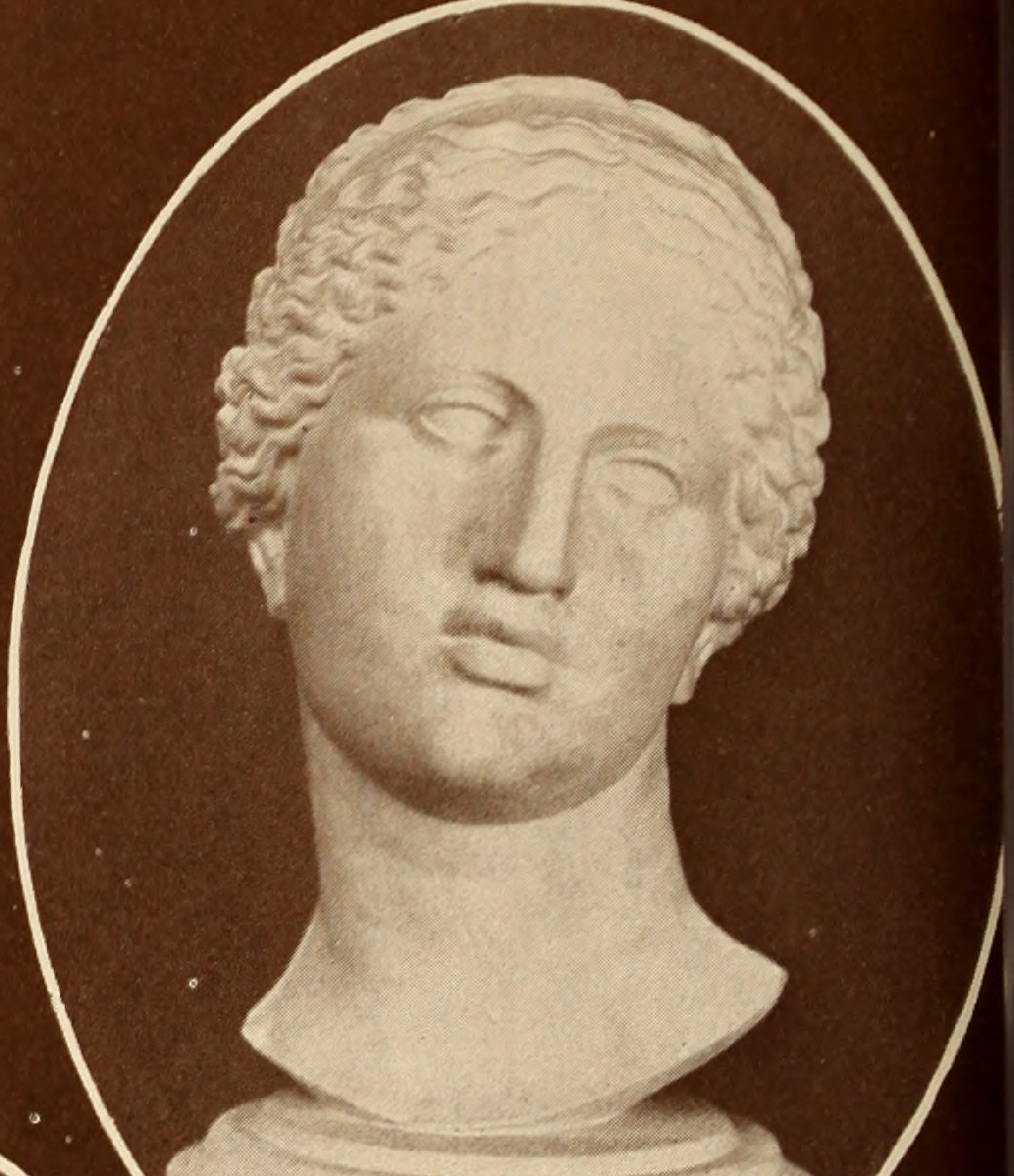

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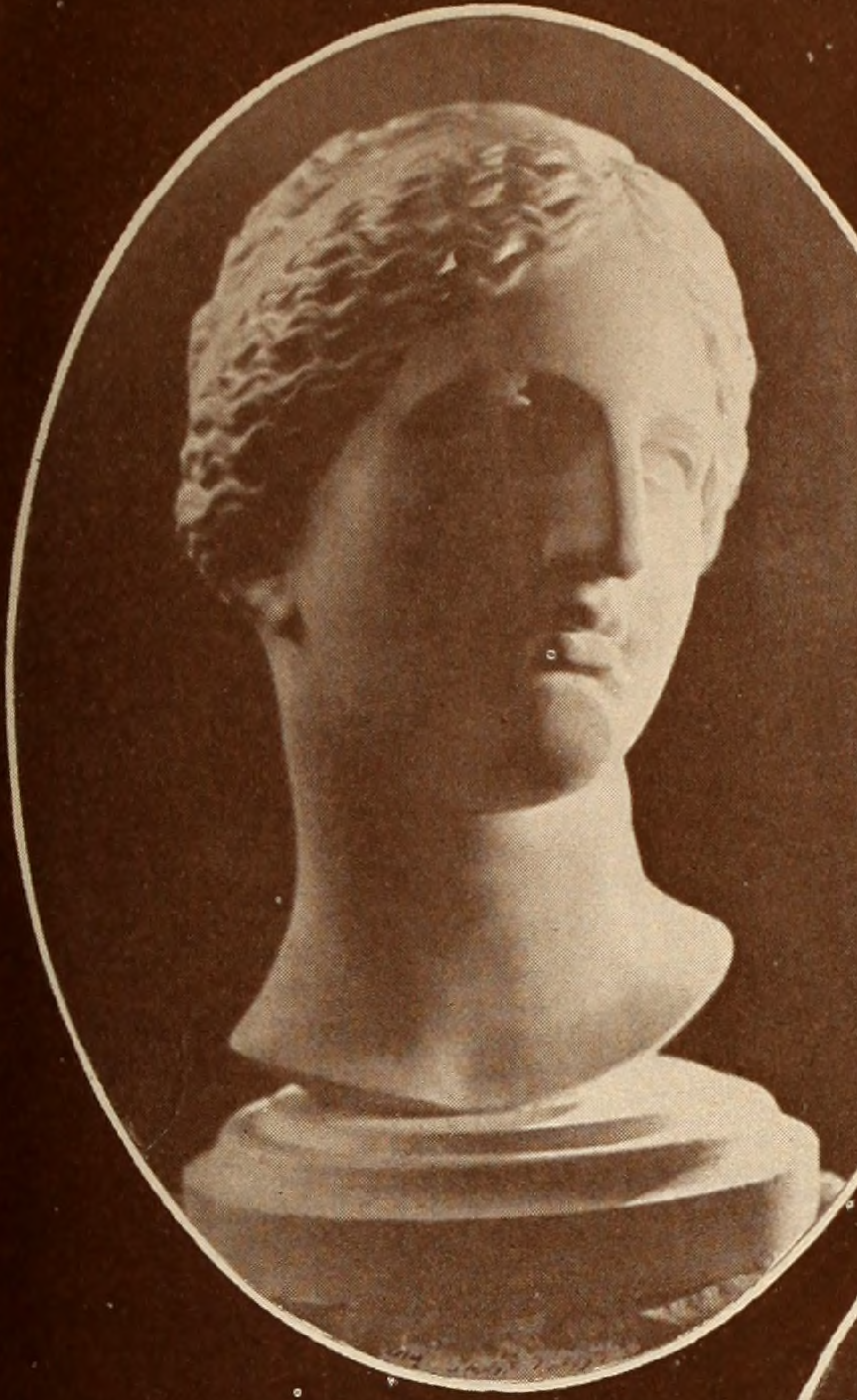

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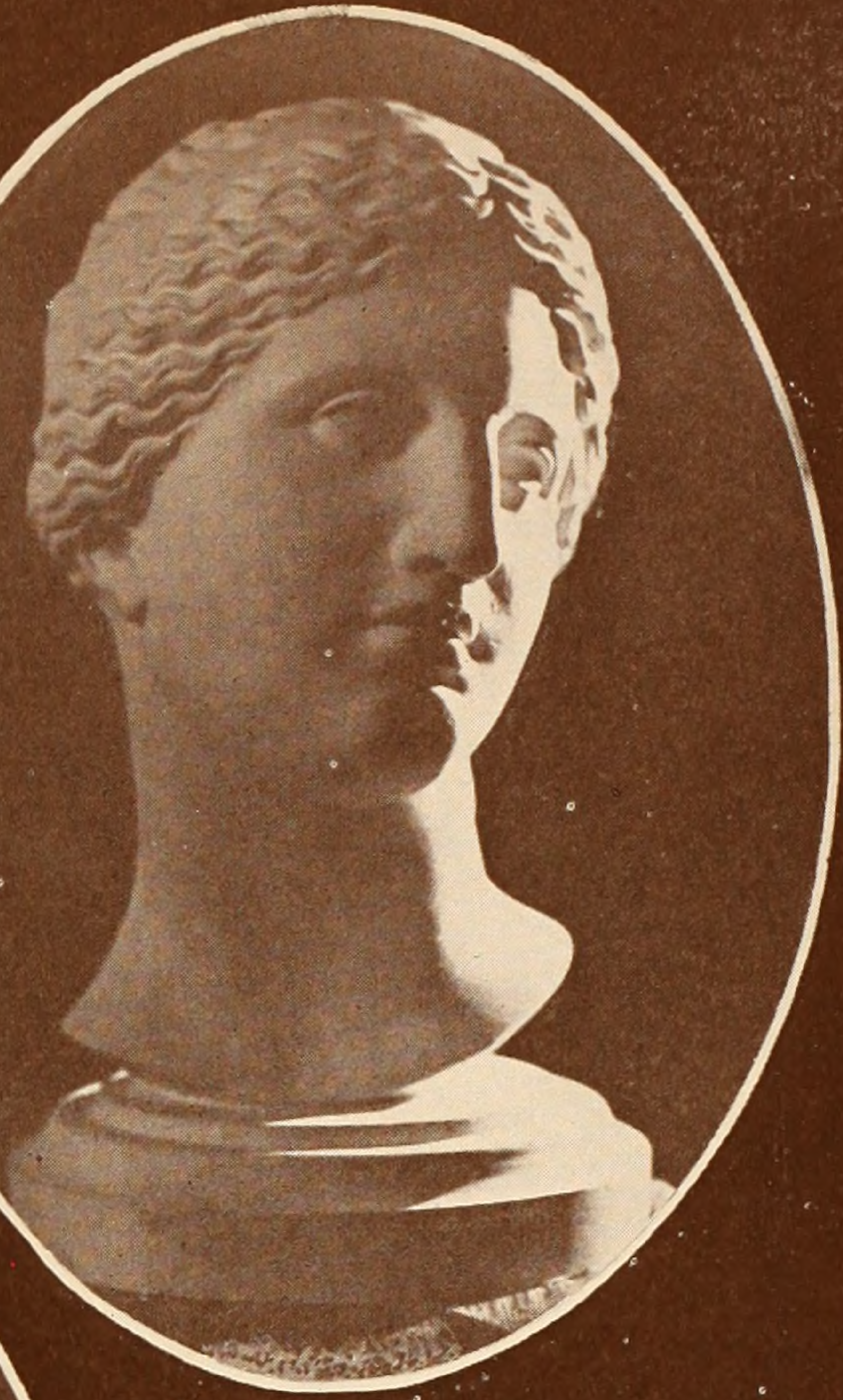

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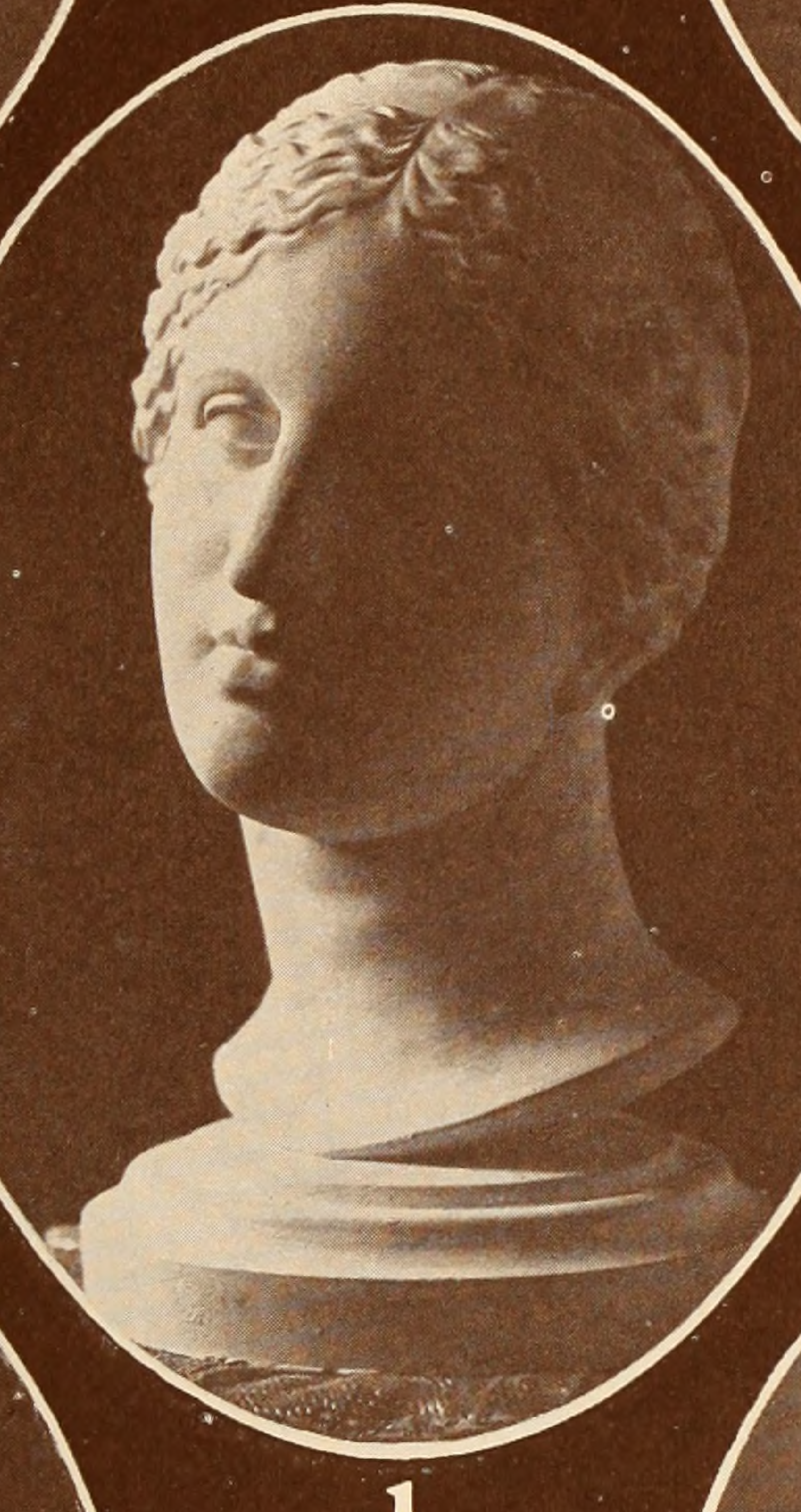

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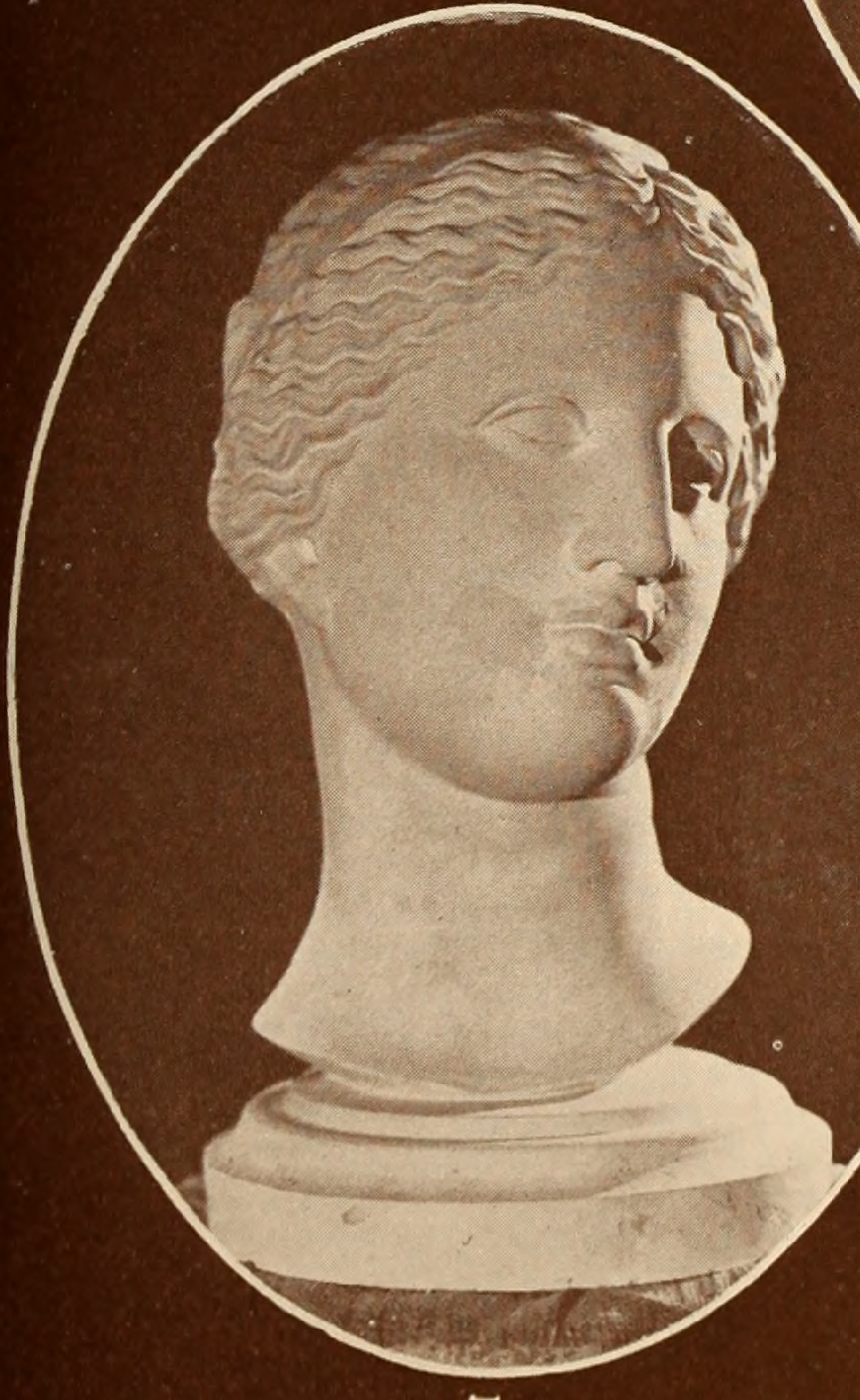

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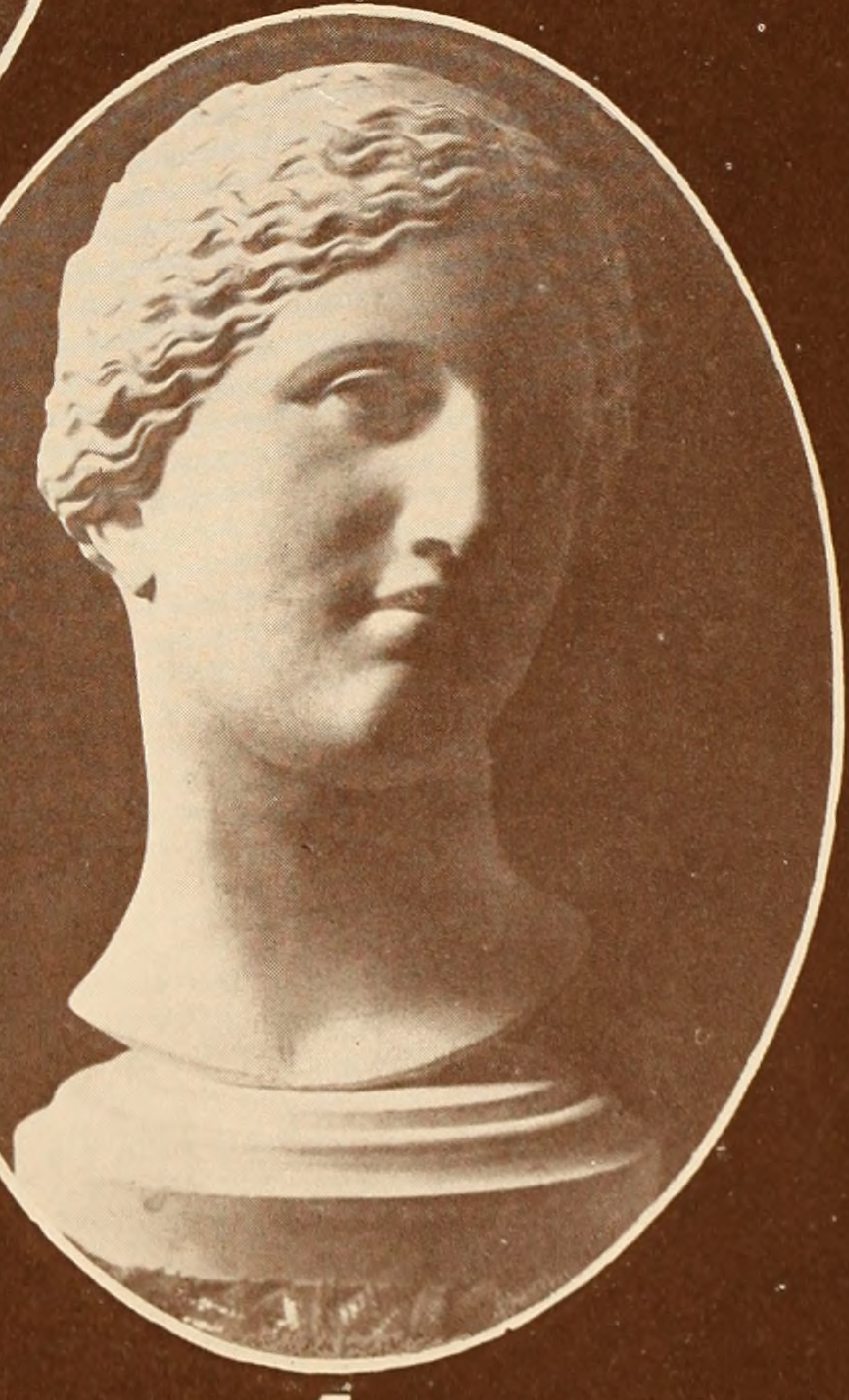

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Continued from Page 19

modeling of the nose, how round and shapely the head and we can almost feel the presence of the eyes. But most important of all, the imperfections on the surface of the cast are hardly noticeable and there is almost a feeling of flesh rather than the hard, cold plaster-paris.

Plate B.

This group shows the three-quarter view. This is an interesting pose of the head from the standpoint of drawing but presents a broad, flat area of cheek, which is not easy to keep from appearing flat. This pose is generally used under the assumption that one side of the face often appears more favorable than the other.

No. 2 B. Is softly back-lighted and the right side held in shade to present a little mystery to the imagination in taking care of the broad area of the cheek, also to hide an ugly blotch on the right cheek.

No. 4 B. Is the same pose, lighted too contrastily and gives a sharp, angular effect down the center of the face.

No. 3 B. In this picture, the few pleasing points of the two preceding lightings are destroyed and no semblance of effect remains, due to too strong and direct a light on the right cheek. Note how the blotches show up as soon as the harsh light is used, also the rough spots and deep, ugly shadows on the left cheek. Observe also the unbalanced expression of the eyes and the lack of any feeling of distance between the extremity of the nose and the right ear. This is just as apt to happen in photographing the living model.

No. 5 B. Here, the small area of the right side is held in shade and an attempt is made to throw the eyes in the shade to create expression and an apparent direction of vision. This scheme of lighting is favorable to light blue eyes. That portion of the cheek which bears the ugly blotch, is also shaded and there is beginning to be a feeling of roundness and distance between the nose and ear.

No. 1 B. Here there is a perfect sense of roundness. Note how the two cheeks seem to lead around to the back of the head. Observe the delicate modeling of the eyes and lips. The living model would require a little stronger reflected light in the shaded portions, but with the cast, too strong a reflect would give a crossed effect to the eyes. This like No. 1 A, is a very fair representation of the work of the great and unknown sculptor and all of these different lightings show that the camera can become a great liar.

We do not deny, however, that for dramatic reasons, some of these effects may be desired rather than avoided, and for those who may be interested, we offer a series of plans showing each arrangement of lighting:

100 represents the full, open unit (arc or globe).
75 a lesser amount, undiffused.
D the full unit with one diffuser.
DD the full unit with two diffusers.
TD the full unit with triple diffusers.
R reflector.

Color Sensitivity of Panchromatic and Infra D Film

[*The accompanying interesting memoranda has just been transmitted to* The American Cinematographer *by Dr. V. B. Sease, director of the Redpath Laboratory of the Dupont-Pathe Film Mfg. Corporation, Parlin, New Jersey. It is presented in its original form as prepared by Dr. White, physicist, of the Redpath Laboratory, with very slight deletions by our technical editor.—Editor's Note.*]

For many pictures it is desirable to produce a correct rendition of the brilliance of the objects photographed as independent of the color of the objects. Such rendition, termed orthochromatic reproduction, is usually approximated by use of panchromatic film with some correction filter to alter the relative intensity of illumination reaching the film in such a manner as to produce a final black and white picture approximating the brilliance values recognized by the eye.

Such orthochromatic rendition is frequently unnecessary and often not desired and various means are used to produce distortion for special purposes. Infra D film is a type that produces marked distortion. Spectrograms of panchromatic film, Fig. 1, and of the Infra D film, Fig. 2, are reproduced and show that green sensitivity present in the panchromatic is absent in the Infra D.

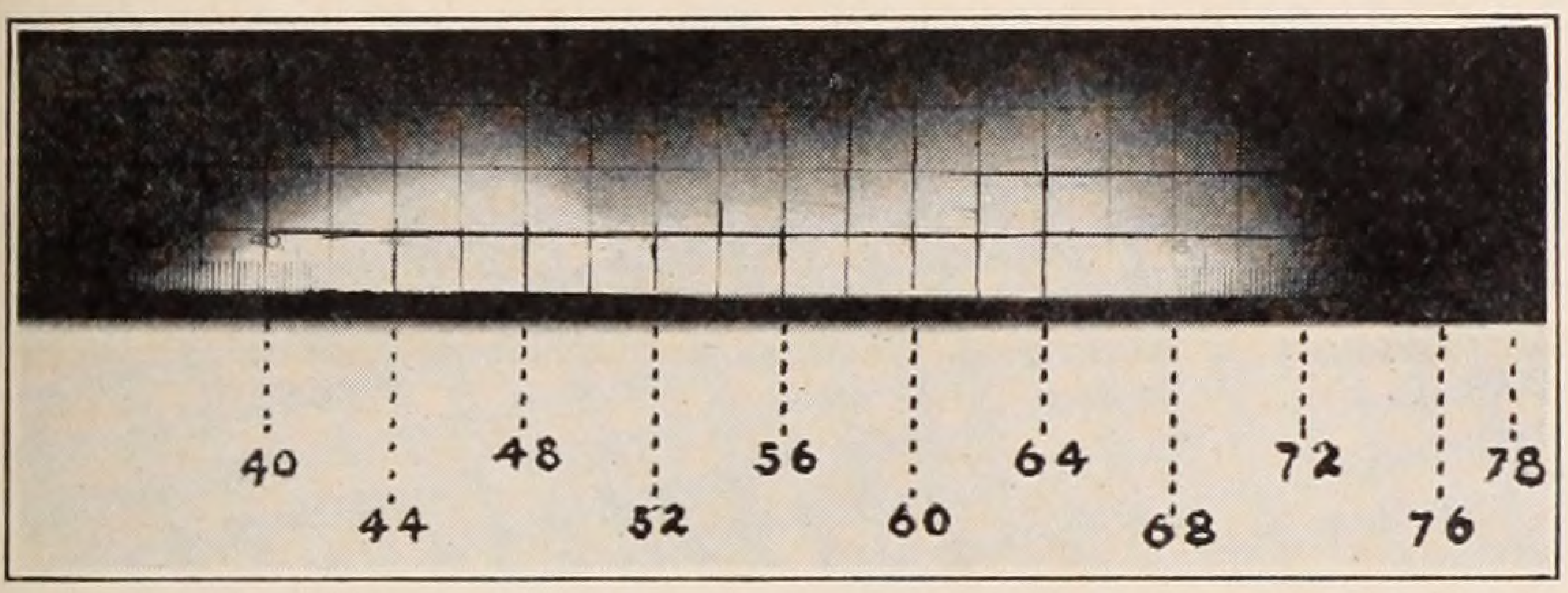

Fig. 1—Spectrogram made on panchromatic film

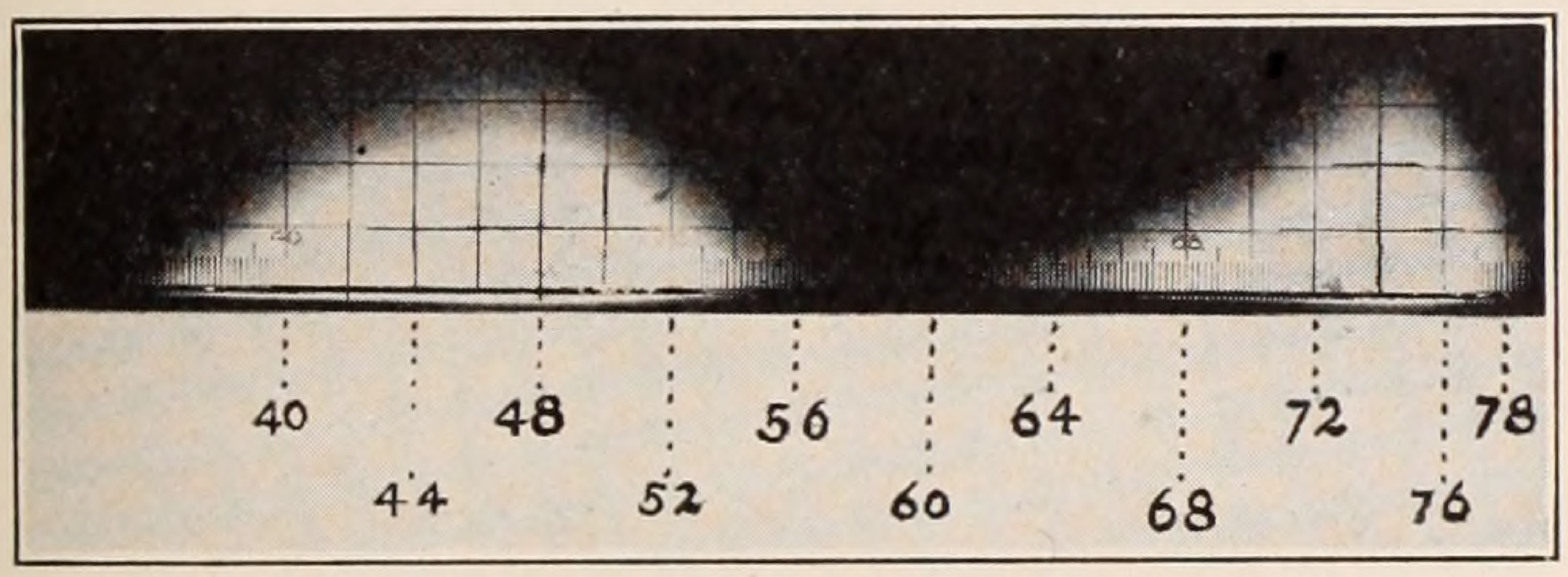

Fig. 2—Spectrogram made on Infra D film

These spectrograms also show for the Infra D an increased sensitivity in the far red and near infra red. These differences produce corresponding differences in the pictures produced. However, as few colors from foliage, buildings, clothes, etc., are spectrally pure, i. e., approximately monochromatic, the differences are easily overlooked in many pictures. This means that satisfactory pictures can be made even with relatively great variations of spectral sensitivity. For practical purposes it is rarely necessary and often undesirable to produce orthochromatic reproduction of the scene photographed. A pleasing picture is in many cases the criterion of good photography, rather than an accurate reproduction of the brilliance contrast of the objects. A wide departure from orthochromatic reproduction produces a pleasing picture in some cases, but usually a rather close approximation to such reproduction proves best.

The differences between the regular Panchromatic and the Infra D films can be shown in another way. Exposures made on a sector wheel with and without filters show differences due to the different spectral sensitivities of the two types of emulsion. Such results are shown by curves plotted in Figs. 3 and 4.

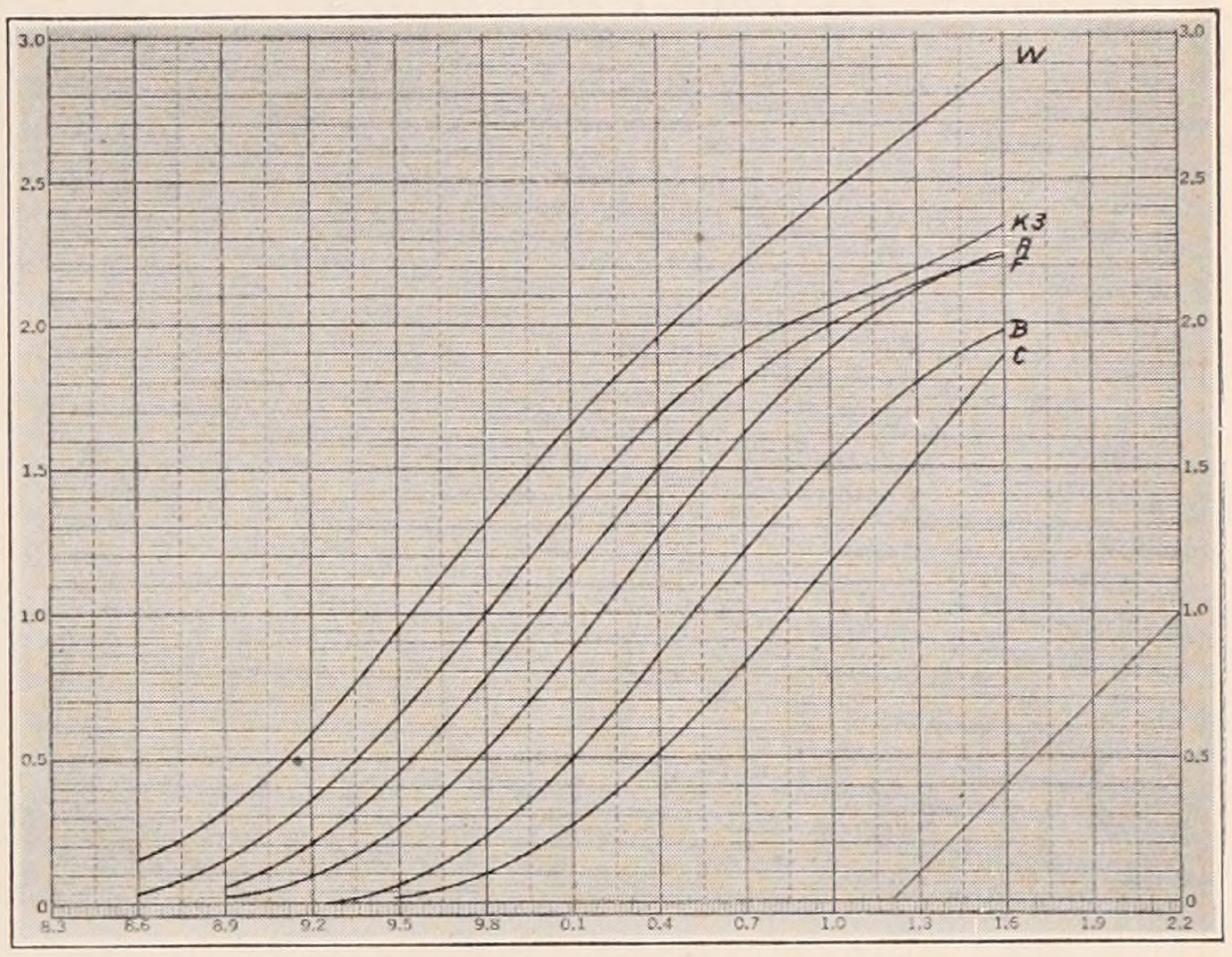

Fig. 3—H & D curves on panchromatic film. W with 2770°K source, unscreened. K3 with 2770°K source, screened by Wratten K3 filter. A with 2770°K source, screened by Wratten A filter. F with 2770°K source, screened by Wratten F filter. B with 2770°K source, screened by Wratten B filter. C with 2770°K source, screened by Wratten C filter.

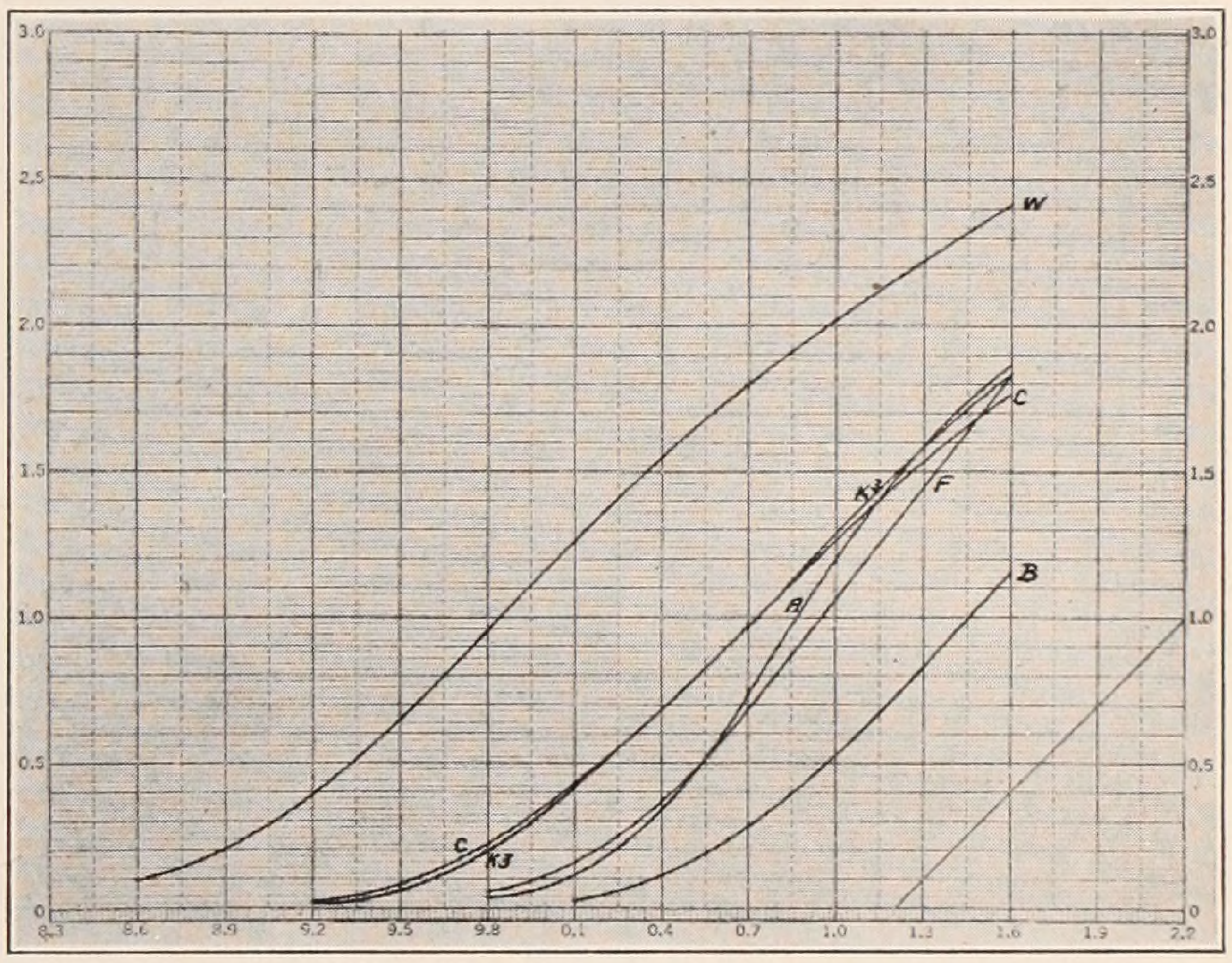

Fig. 4—H & D curves on Infra D film. W with 2770°K source, unscreened. K3 with 2770°K source, screened by Wratten K3 filter. A with 2770°K source, screened by Wratten A filter. F with 2770°K source, screened by Wratten F filter. B with 2770°K source, screened by Wratten B filter. C with 2770°K source, screened by Wratten C filter.

The light source was an inside frosted lamp, operating at a color temperature of 2770°K and giving, unscreened, an illumination of 5.85 meter candles at the plane of the exposed strips. The wheel was driven at such a speed as to give an exposure of .150 seconds at the aperture, corresponding to a log E value denoted 0.1 on the curves. The exposure time increased and decreased by factor two steps above and below this value. Exposures to the source indicated were made with no screen and then with certain of the Wratten light filters, indicated in the figures, between the light and the film.

Continued on Page 24

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The curves show the results of such exposures and Table 1 shows both the visual and the effective photographic transmission of these filters for this source of color temperature 2770°K.

TABLE 1

Effective Photographic Transmission of, and Filter Factor for Various Filters on Dupont Panchromatic and on Dupont Infra D, with an Incandescent Lamp, 2770°K Color Temperature. The Total Relative Visual Transmission of These Filters Is Also Given.

		PANCHROMATIC		INFRA D	
Filter	% Visual Transmission	% Transmission*	Filter Factor*	Transmission*	Filter Factor*
K3	80	59	1.7	13	7.4
F	7.1	22	4.6	6.9	14
A	24	37	2.7	7.6	13
B	26	10.5	9.5	2.3	43
C	2.3	5.2	19	13	7.4

*The values used correspond to density 0.7 on the curves of Figs. 3 and 4.

A comparison of columns 2, 3 and 5 of Table 1 shows the magnitude of the differences between the reproductions with these films, and orthochromatic reproduction. On the positive print from the panchromatic film, in general, blues and deep reds will be rendered lighter than with orthochromatic reproduction, greens and yellows, darker. With the Infra D film, differences are greater. With this film the subtraction of blue by the K3 filter gives only an effective transmission of 13 per cent, as against a visual transmission of this filter with this source of 80 per cent. On the other hand, the C filter used, which passes red light of wave lengths greater than 740 millimicrons, has a visual transmission of only 2.3 per cent, while the photographic transmission on Infra D film is 13 per cent. The comparison of the visual and photographic transmission for the other cases show that departure from orthochromatic rendition are much greater for the Infra D film than for the panchromatic material.

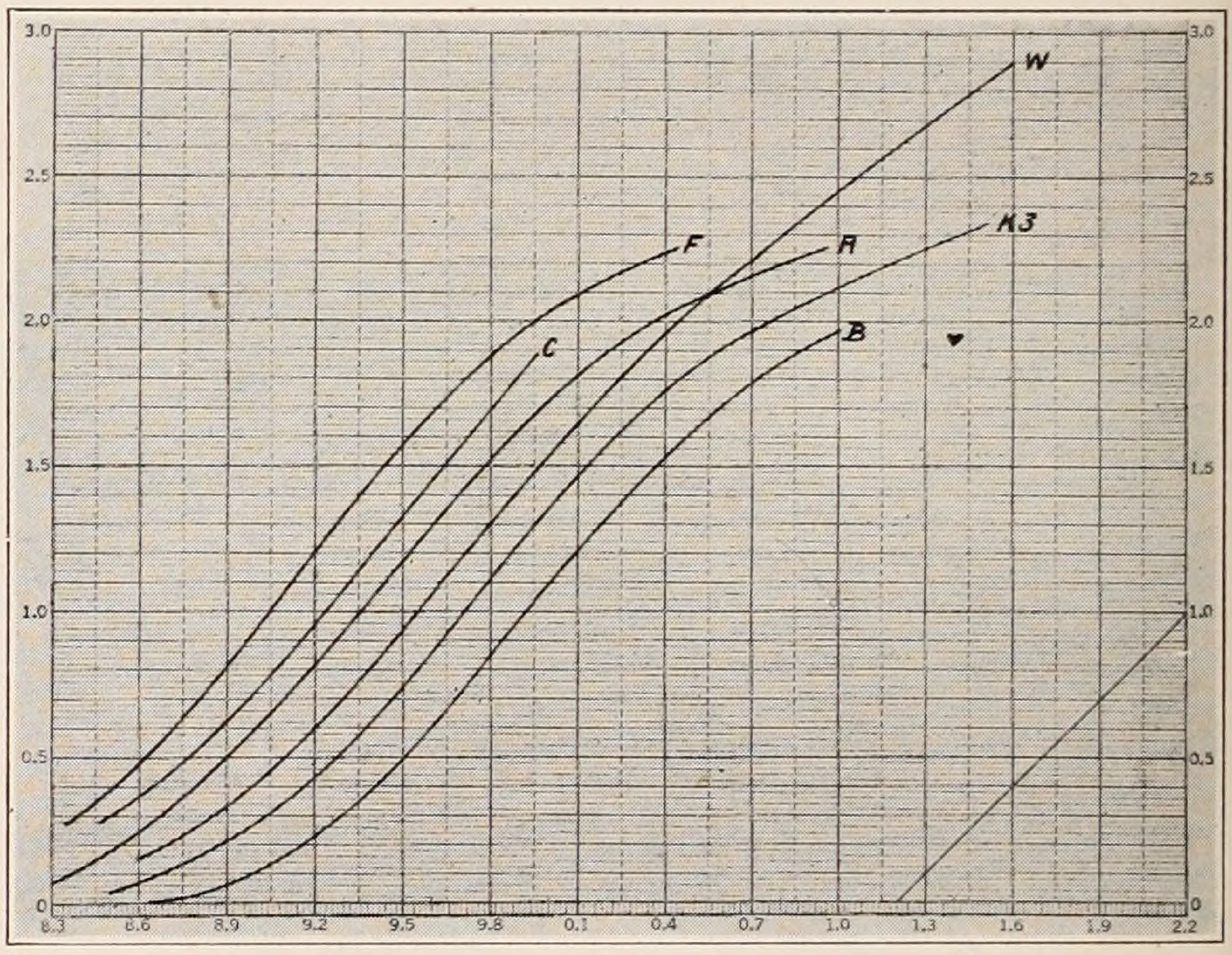

Fig. 5—H & D curves on panchromatic film shown in Fig. 3, displaced to represent equal visual brightness for the different filters at the same point on the log E axis. (This assumes the reciprocity law.)

As a second means of visualizing these facts the curves shown in Figs. 3 and 4 are replotted in Figs. 5 and 6.

Each curve is shifted on the log exposure axis an amount equal to the log of the reciprocal of the total relative visual transmission of the filter used in obtaining the curve. A film that had the same sensitivity characteristics as the eye would have the curves as now plotted all coincident. The actual curves are not coincident. On the panchromatic material, Fig. 5, the F, C and A filters are rendered as too bright, the discrepancy for the F filter being greatest and for the A filter least, while the B and K3 filters appear as too dark, the discrepancy for

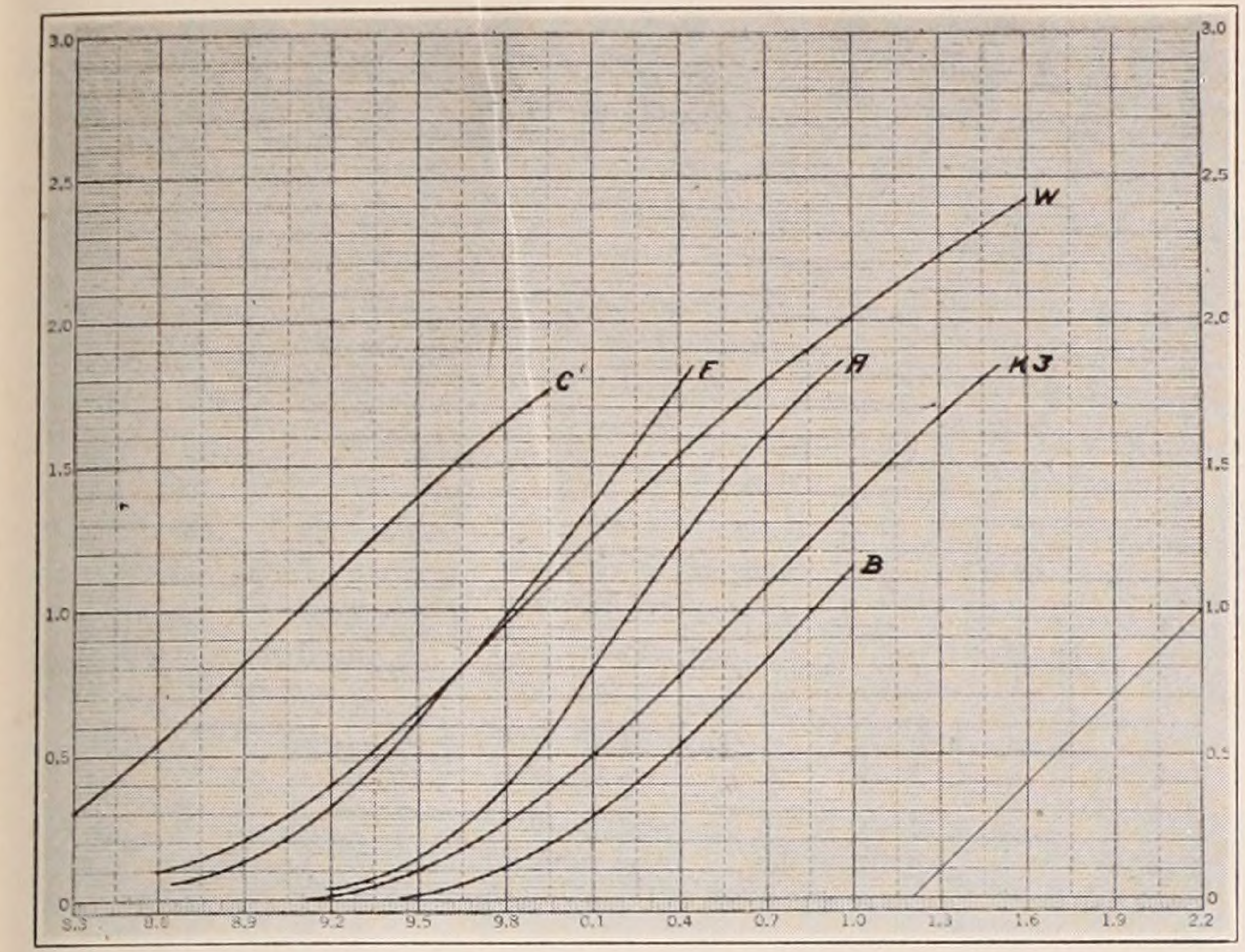

Fig. 6—H & D curves on Infra D film shown in Fig. 4, displaced to represent equal visual brightness for the different filters at the same point on the log E axis. (This assumes the reciprocity law.)

the B filter being the greater. With the Infra D material the contrast changes with the change of filter are more marked than for the panchromatic material, but still it is possible to easily distinguish in a general way the differences from orthochromatic reproduction. Here the C filter is rendered several times too bright, while the F filter appears approximately correctly placed. The B, K3 and A filters are all rendered too dark, the departure of the B filter being greatest and of the A least.

From the results just presented it is evident that a correction filter to give orthochromatic reproduction with regular panchromatic material must transmit more in the green and yellow region than it does in the blue and far red. As Jones (¹) has pointed out, the correct character of such a filter depends not on the light source but only on the nature of the emulsion, and also that it is too dense for practical work. Hence, it follows that such a correction filter calculated and made for one emulsion will not in general be correct for another emulsion. The character of such filter for Infra D stock, if one were attempted would be very different than for regular panchromatic material.

When we come to a special field where correct rendition of object brightness is not desired, there are possibilities in the Infra D film largely absent in the panchromatic material.

Fig. 7 shows pictures taken in direct noon sunlight at the corner of a red brick building with green foliage and blue sky also in the picture. The board in the hands of the person there pictured was covered with a gray felted paper, approximately neutral in character. The pictures were taken at the stops indicated corresponding approximately to the filter factors given in Table 2, keeping camera speed constant. The prints used for the reproduction from either negative material were made at the same time on one sheet of paper, so either series, at least in the original print, gives a basis of judgment of accuracy of determination of the filter factors employed as well as showing the pictorial differences produced. Here again, the lack of green sensitivity of the Infra D film is shown by the fact that after the practically complete subtraction of blue by a short wave cut filter, there was practically no change of filter factor necessary, though the color and visual density of the filters employed varied widely. Again the Infra D film shows the foliage as light in color with a short wave cut filter and corresponding increased lens aperture, while the corresponding pictures on panchromatic material show no such character, even with the deepest red used, the No. 70 Wratten filter.

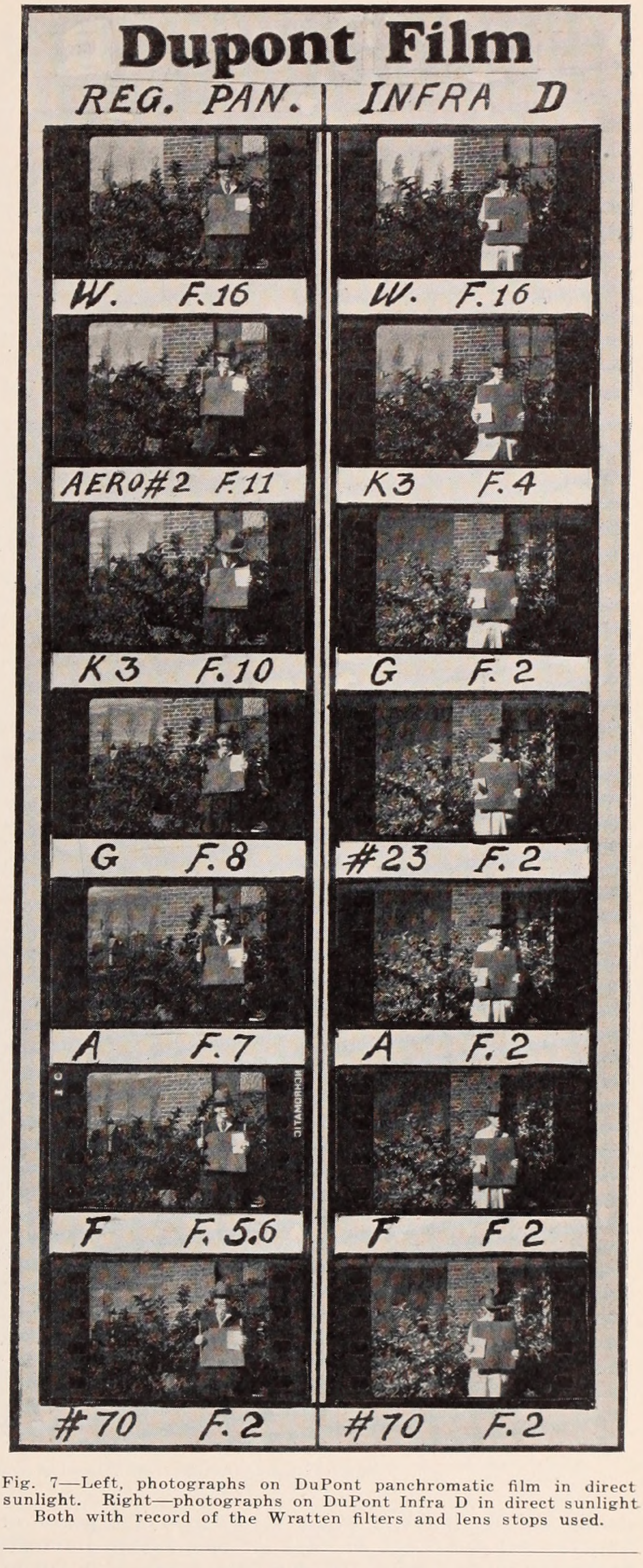

Fig. 7—Left, photographs on DuPont panchromatic film in direct sunlight. Right—photographs on DuPont Infra D in direct sunlight. Both with record of the Wratten filters and lens stops used.

TABLE 2

Filter Factors Indirect Sunlight for Certain of the Wratten Light Filters

Filter	Panchromatic	Infra D
Aero No. 1	2	----
K3	3	16
G	3.5	55
23	----	60
A	6	64
F	8	64
70	64	64

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(1) Loyd A. Jones "Light Filters," Part Three. American Cinematographer, Vol. IX, No. 2, p. 13, May, 1928.

A.S.C. Approves Vitacolor

By JOHN W. DES CHENES

Vitacolor—cinematography's newest color sensation—has been received with rare enthusiasm wherever it has been demonstrated; but it passed its severest test on the night of January 7, of this year, and so did its inventor.

Imagine your own embarrassment if you were the discoverer of this process and suddenly found yourself among fifty fellow-members of the American Society of Cinematographers, before whom you were supposed to display your wares! Can you conceive of a more critical audience to entertain under the circumstances? Do you suppose the men who compose the heart and soul of the motion picture industry would resort to undue praise or flattery over a subject so vital to their future interests as colored photography? If anything, would they not be apt, through their training and natural sense of observation, to find glaring faults which the average layman would overlook?

In any event, I should rather have stood in Daniel's shoes and faced the lions than to have been Max B. Du Pont on the night in question. Mr. Du Pont, of course, needs no introduction as the man whose brain conceived Vitacolor.

But I am rapidly coming to a misleading point. I have only congratulations to offer Mr. Du Pont, and no pity. For I can say without hesitation, having eyes and ears for a good purpose, that Vitacolor has received the official stamp of approval by that splendid body of men who play such an enormous part privately and such an insignificant role for the public to see in one of the world's greatest industries. I know that Mr. Du Pont was more touched by the enthusiastic ovation accorded his discovery on this occasion than upon any other. And justly so. It is only natural to value most that praise which comes from honest lips and critical minds unbiased by friendship.

So they came, these cinematographers who have "cranked" scenes whose aggregate cast runs into billions of dollars. They wanted to see if Vitacolor really stood up to its advance notices. With them was Joseph A. Dubray, technical editor of the A. S. C. Magazine, and a cinematic technician of world-wide reputation.

Max Dupont, Inventor of Vitacolor, and Miss Mary Mabery, the "Vitacolor Girl."

To do the men credit, all but Mr. Dubray, who had seen Vitacolor before and proved something or other by his willingness to re-attend a demonstration, I should not be surprised if they had come prepared for a disappointment. Not are they to be blamed. If the "perfect" motion picture color processes that have been discarded by producers as useless could be laid end to end —you know the rest. Hollywood is a place where men suddenly pop at you from around a corner and shout:

Welcome to Rainbow Road

THE AMERICAN CINEMATOGRAPHER hereby extends a whole-hearted welcome to **The International Photographer,** voice of the International Photographers of the Motion Picture Industry, just issued. The new publication is the official gazette of the I. P. M. P. I., and will be issued monthly from the Hollywood headquarters of the organization in the Markham Building. To Ira Hoke and Art Reeves is due a lot of credit for the work they did in getting the first issue on the press. Improvements will be made as the months reel off and among these will be an original front cover design by Louis W. Physioc. The I. P. M. P. I. is affiliated with the I. A. T. S. E., and has a membership of more than seven hundred. The new member of Hollywood's steadily growing family of film publications looks like a winner before the ink gets dry.

Mr. John F. Howell, secretary-treasurer of Akeley Camera, Inc., was a caller at A. S. C. headquarters during January. He reports much interest in the new Akeley tripod and considerable business in sight.

Mr. R. E. Farnham, of the National Lamp Works, Nela Park, Cleveland, Ohio, is in Hollywood studing the light situation. He will address the A. S.C. on the general subject of picture lighting on the night of Monday, February 4th, at A. S. C. headquarters in the Guaranty Building, Hollywood.

"At last, I have invented a color process that will revolutionize the movies!" The familiar refrain has become almost as tiresome as "Sonny Boy."

But, seated among the ghosts of early screen successes that had their inception in the old Lasky Realart Studios, where Vitacolor is now being made ready for professional and amateur use, the A. S. C. members had not to be shown more than two or three scenes before they became lavish with their applause. Especially was this so during the projection of scenes along the Monterey Coast. Nearly all of those present were familiar with the delicate coloring with which Nature has imbued this memorable territory. And when its likeness, to an exact nicety, was thrown upon the screen, repressed enthusiasm was out of the question.

And fish! I can hear you say there is nothing to get excited about in an undersea denizen, save when you have landed a big one. But this was different. The applause elicited from those fifty-or-more pairs of hands when they were shown pictures of gold and silver fish swimming lazily above vari-colored pieces of coral and stone, was spontaneous because their owners had seen gold and silver fish before, and knew if the coloring was natural or not. Scenes of the last Tournament of Roses parade, at Pasadena, were likewise accorded a great ovation.

And when Mary Mabery, screen star, looked out from the silver sheet upon what will probably prove to be her most critical audience, I think she was largely instrumental in winning half-a-hundred new friends for Vitacolor. Few tints are harder to reproduce in photography than the coloring of the human flesh. This was done to the enthusiastic satisfaction of everyone present. It was, as one cinematographer expressed it: "Like looking at someone you knew wasn't real, yet you had to believe she was." For the excellent adaptation of her type to colored cinematography, Miss Mabery has earned the title of "The Vitacolor Girl."

The evening turned out to be one of deep appreciation all around. Mr. Du Pont's confreres in the A. S. C. did not attempt to conceal the pride they felt that from their ranks was born one of the most important developments of cinematography. And the inventor of Vitacolor was profoundly moved by the plaudits and interest displayed by his associates.

In playing host to the Cinematographers, Mr. Du Pont was assisted by Harold S. Ryerson, general manager of the controlling company of Vitacolor, who promised that the new process will be made ready for the professional screen as quickly as a surplus demand for attachments for amateur cameras can be supplied.

You can have
high actinic value
without heat

THERE'S nothing like Cooper Hewitts for yielding soft light high in actinic value without excessive heat.

Keep plenty of "Coops" in close (with arcs or Mazdas farther back if you need red rays) and avoid the heat that causes make-ups to run and eyes to suffer from glare.

Coops continue to give economy and satisfaction, just as they have the years past in cinematographic studios everywhere.

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HOLLYWOOD—7380 Santa Monica Blvd.
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METEOR
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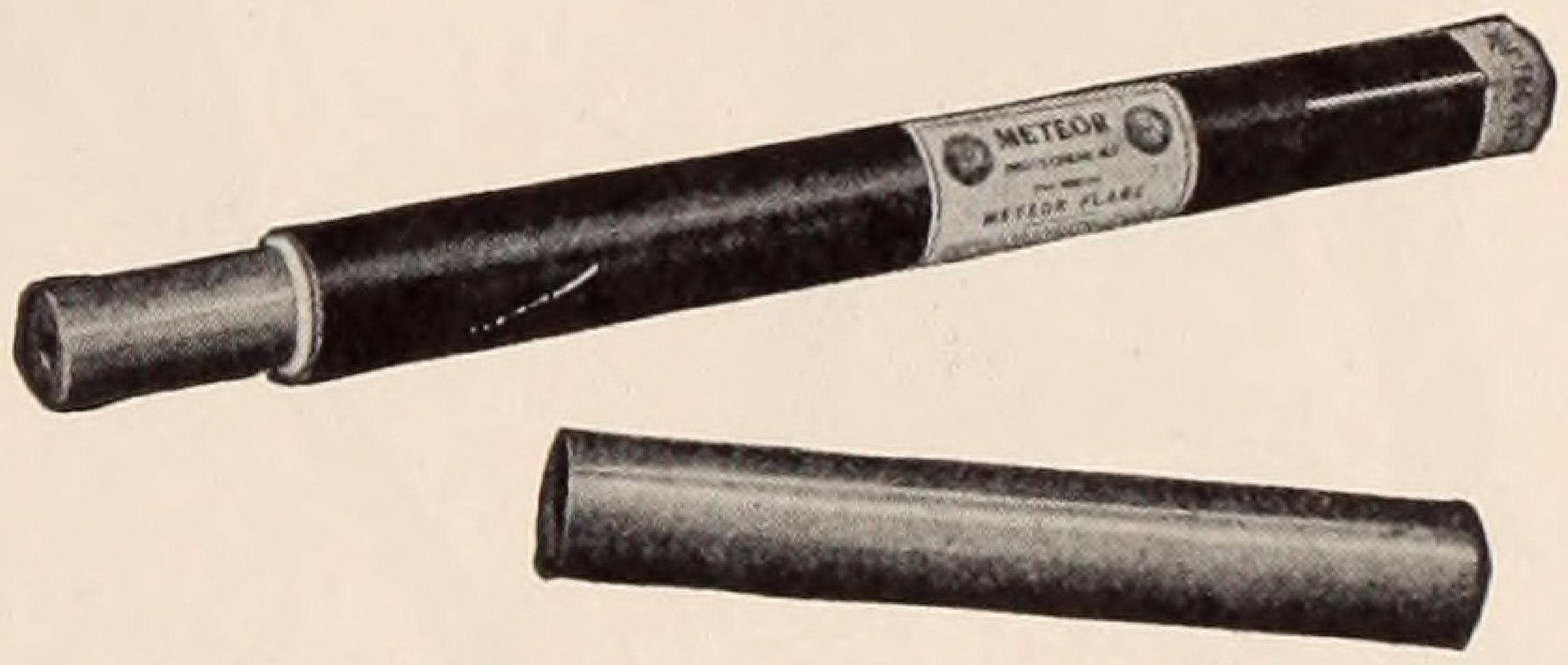

2 min. Flare with Demountable Handle

With Meteor electrically fired flares the ignition or fire control is centralized and under the hand of the cinematographer. Full illumination the instant the circuit is closed—no waiting for the fuse and "first fire."

Whole batteries of flares may be started simultaneously the instant desired. A single cell flashlight battery will light a flare—a small sized 22½ volt radio battery will ignite 15 and the battery may be used repeatedly. Series connection allows galvanometer tests of connections.

Also regular match ignited flares.

Three main distributing points: Edward H. Kemp of San Francisco; Bell & Howell of Chicago; John G. Marshall of Brooklyn, N. Y.

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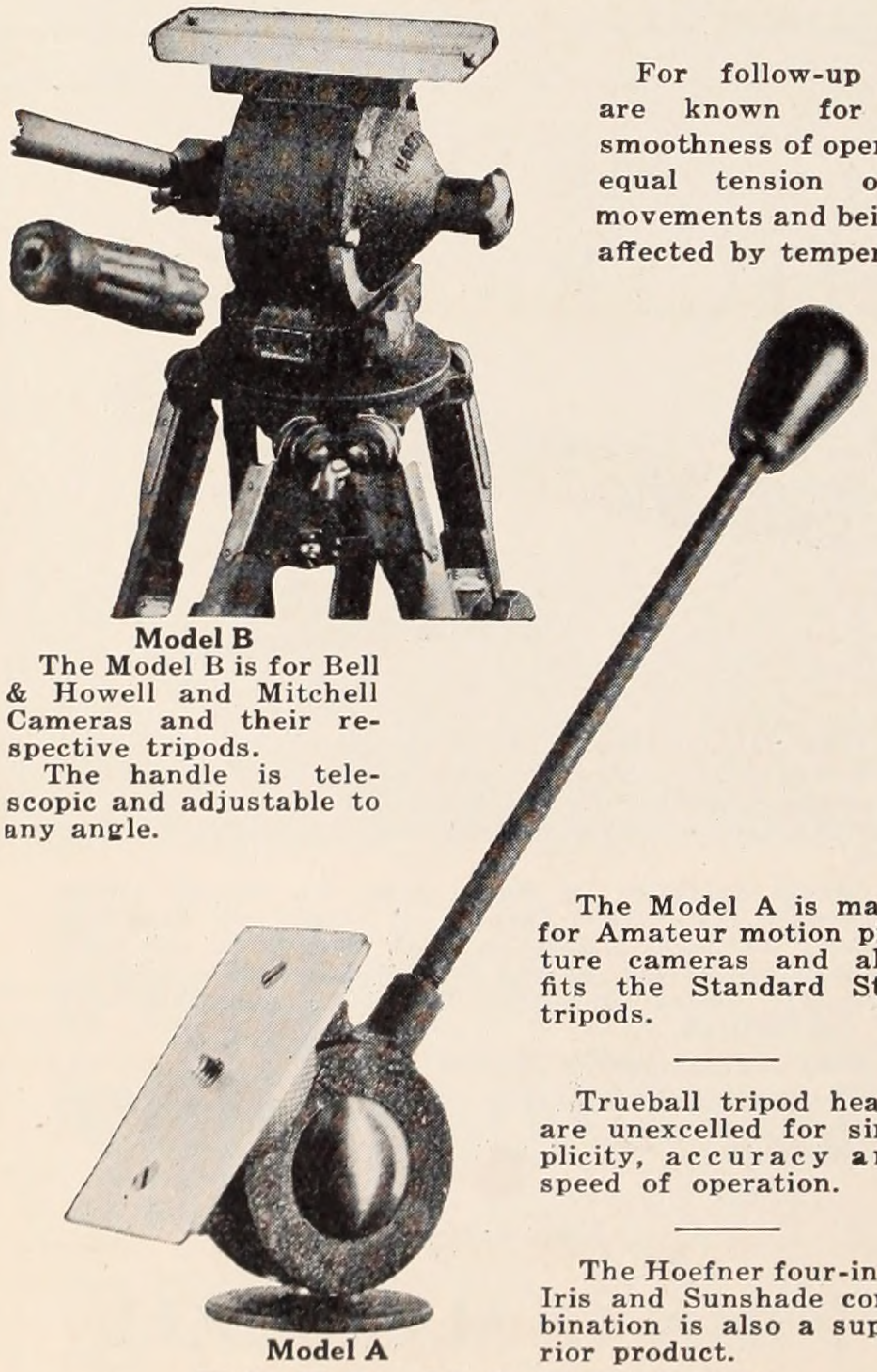

For follow-up shots are known for their smoothness of operation, equal tension on all movements and being unaffected by temperature.

Model B
The Model B is for Bell & Howell and Mitchell Cameras and their respective tripods.
The handle is telescopic and adjustable to any angle.

The Model A is made for Amateur motion picture cameras and also fits the Standard Still tripods.

Trueball tripod heads are unexcelled for simplicity, accuracy and speed of operation.

The Hoefner four-inch Iris and Sunshade combination is also a superior product.

Model A

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Projection Advisory Council

The Projection Advisory Council has been organized to "Develop a better realization of the importance of good projection and to assist all activities seeking to improve projection conditions." This is a broad and comprehensive declaration, requiring much detailed explanation, but the plans which are quite simple and workable have received the strong endorsement of Government and Municipal Departments, large industrial and commercial organizations, engineering and projection societies and many of America's best known projectionists.

BOARD OF DIRECTORS

Lester B. Isaac, President, Supervisor of Projection, Loew's Inc.
Laurence Jones, Secretary and Treasurer, formerly Editor of "American Projectionist."
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C. Eichhorn, Vice-President, Local No. 306, New York.

CHAIRMEN OF COMMITTEES

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Safety—George Edwards, President American Projection Society.
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Awards—Thad. Barrows, Metropolitan Theatre, Boston, Mass.
Resolutions—B. Stern, Rialto Theatre, New York.
Public Relations—Harry Sherman, Publix Theatres, New York, formerly Assistant President, I. A. T. S. E. M. P. M. O.

All the officials of the Projection Advisory Council are men of standing in this field, and have been connected with the motion picture industry for many years. The majority of them are noted projectionists who are active in other work, and in the list of Directors and Chairmen of Committees are included manufacturers, business men, lawyers, a member of a State Legislature, graduates of well-known colleges, and officials of various organizations. All of them are ambitious, progressive men who have given much of their own time for the advancement of the motion picture industry.

The chief purpose of the Projection Advisory Council is to conduct a campaign of constructive propaganda and there will be no conflict with the work of any other organization, no duplication of effort. Ignorance and indifference are costly and can only be dispelled through education. A clearer realization of just what good projection means will be of inestimable value to the public and the motion picture industry.

Various agencies and individuals have worked in the past to improve projection conditions, but the efforts of the Projection Advisory Council will be more collective and concentrated. We feel sure that the unified influence is highly necessary in the Projection Department, which has attained a greater importance and become more complex with the tremendous expansion of the motion picture industry.

No attempt will be made to have the Projection Advisory Council comprehensively function at once; each Committee will be given one simple, workable but important task before starting any other activity for the Council. Elaboration of the plans of the Projection Advisory Council will be postponed until, by the successful performance of certain practical but highly essential work, we can gain the confidence of the industry. Accomplishment will be slow, but in the meantime we ask the industry to be patient and to have faith in the men who have associated themselves with the Projection Advisory Council.

The Projection Advisory Council is international in its membership, and all possible care is being taken in the selection of the Directors and Chairmen of Committees. Ideas similar to those upon which the Projection Advisory Council has been founded have been put into successful operation in many other industries, and we see no reason why eaqually satisfactory results cannot be secured by the Projection Advisory Council for the benefit of the motion picture industry.

Panchromatic light from your present arc lamps

NO NEW equipment will be needed when you decide to use panchromatic film in your cameras. Just insert National Panchromatic Carbons in your present arc lamps and shoot. These carbons provide light that is accurately matched to the film, and the result is the correct tone for every color in the scene.

In addition, National Panchromatic Carbons are unusually economical. They provide more photographic light per watt of power than any other light source, except only National White Flame Photographic Carbons, and more visible light per watt of power than any other light source.

Your present arc lamps, plus a supply of White Flame and Panchromatic Carbons, offer you the widest possible range of studio lighting.

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Gentlemen: Please find enclosed three dollars (foreign rates additional), for one year's subscription to the AMERICAN CINEMATOGRAPHER, to begin with the issue of

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Back to Beginnings

Hollywood's First Introduction to Talking Pictures Was in 1914 When the Kellum System Was Launched

[*In its efforts to keep the records straight and place credit for talking pictures where credit is due,* The American Cinematographer *herewith reprints an advertisement of "The Major Company," published in the Los Angeles Examiner of May 28, 1914.*

Mr. Kellum, referred to in this ad, is a resident of Hollywood and The Cinematographer *is informed that his patents were sold sometime ago to one of the large producing companies and that these patents form the basis of one of our best known sound systems. Mr. Kellum perfected his first successful synchronizing system in 1913, here in Hollywood, and this system was first demonstrated in New York City at Town Hall as the feature of the prologue to D. W. Griffith's "Dream Street." The demonstration was hailed as a success. Another interesting chapter on the Kellum System will be published soon in* The Cinematographer. *—Editor's Note.*]

ADVERTISEMENT
From the Los Angeles Examiner of May 28, 1914.

I am the Major.

I am always in the lead.

My business is to talk to you from the screen of your favorite motion picture house, announcing the pictures, the actors who appear in the picture and the headings for the different scenes.

I am the symbol of the major talking picture, that wonderful new invention by the western wizard, O. E. Kellum, wherein the pictures upon the screen talk in absolute unison and harmony with the actions of the artist.

The Major Film Company controls the patents of the Kellum Talking Picture, wherein lies perfect synchronism. They control the patent also of apparatuses designed to give a full evening's performance without the troublesome, tiresome and aggravating stop for change of either film or talking machine record. The idea of making talking pictures with the use of a device similar to the dictograph concealed about the person of the actor, instead of the actor talking into a horn, is also ours.

Mr. Clune, the owner of Clune's Theatres in the city of Los Angeles and elsewhere, has witnessed a demonstration of this wonderful machine and of his own volition, has written the following letter:

The magnificent new home of Max Factor Products, largest manufactory of make-up materials in America. Their Panchromatic Make-Up has swept both stage and screen and has become internationally famous over night. "Factor's Products—The Greatest Factor in Make-Up."

"Major Film Manufacturing Company,
"806 Security Bldg.,
"Los Angeles, California.

"Gentlemen:—

"I have just been informed that you have acquired the exclusive rights to manufacture and distribute the Kellum Talking Picture.

"Permit me to congratulate you on this acquisition to your company.

"I had the pleasure of seeing it recently and have no hesitancy in saying there is an unlimited field for it, and it will make the moving picture even more popular than at present.

"All human element being eliminated, makes the voice and action absolutely synchronous.

"Wishing you every success, I am,

"Yours truly,

(Signed) "W. H. CLUNE."

The original of this letter and numerous other letters from men whose knowledge of what is what in the Motion Picture Field cannot be questioned, are on file in our office.

We are desirous that just a few people become associated with us in this wonderful profit-making venture. What other companies have done simply manufacturing Motion Pictures, we can do, and added to that possibility we have the additional source of revenue from our TALKING PICTURES.

As soon as the present allotment is sold, the shares will positively advance 50 per cent. This Corporation has behind it tangible assets, approximately 100 acres in Laurel Canyon Heights, and 6 acres in Santa Barbara, both of which places are ideal for the present and prospective work of the company.

The new booklet entitled "Major Talking Pictures," what they are and what they mean to the Motion Picture world, just off the press.

Don't forget that the opportunity of becoming affiliated with a project whose product is vouched for by some of the biggest men in the community and whose officers and directors are successful and prominent business men of your city, is limited.

If you cannot come in, clip the enclosed coupon and we will gladly mail to you our new literature stating in detail the prospects of the company. Come in, if you can, however, and let Mr. Kellum explain his invention to you.

Talk to the President of the company, see our offices and let us make arrangements for a demonstration of this wonderful machine for you. It won't cost you anything unless you are perfectly satisfied. But, be sure and come in as the allotment is limited.

Kindly send me without any obligation on my part your new booklet just off the press, and whatever other authorized literature you have.

Signed..

E. B. DuPar, A. S. C., just recently finished a 100 per cent all talking picture for Warner Brothers and was sent to New York to break in a crew to do Vitaphone at Warner's Brooklyn studio.

ELMER G. DYER
AKELEY SPECIALIST
Aerial Photography Since 1918
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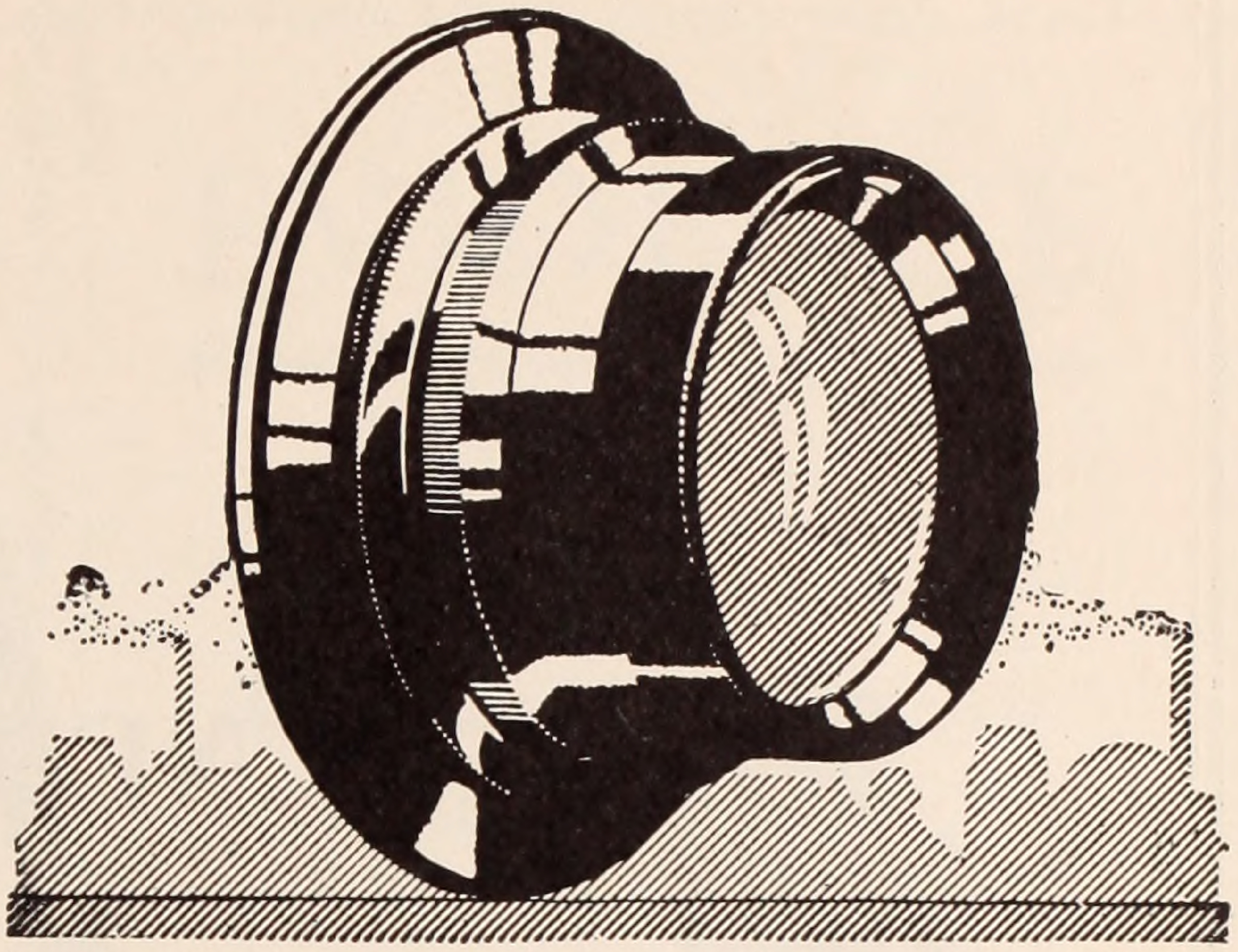

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We pay top market for all makes of film. Ship all your junk film direct to our mill and modern disintegrating plant, guaranteeing absolute photographic destruction. Write or wire approximate quantity of film you wish to ship. We will dispatch sufficient drums and advise market price from your city.

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If you are in the Motion Picture Industry you need
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Only $3.00 Per Year.

The Akeley Gyro Tripod may be had with either studio legs or news and outdoor legs.

Weight of tripod with studio legs — 30 lbs.
Weight of tripod with news legs — 24 lbs.

The NEW Universal Gyro Tripod

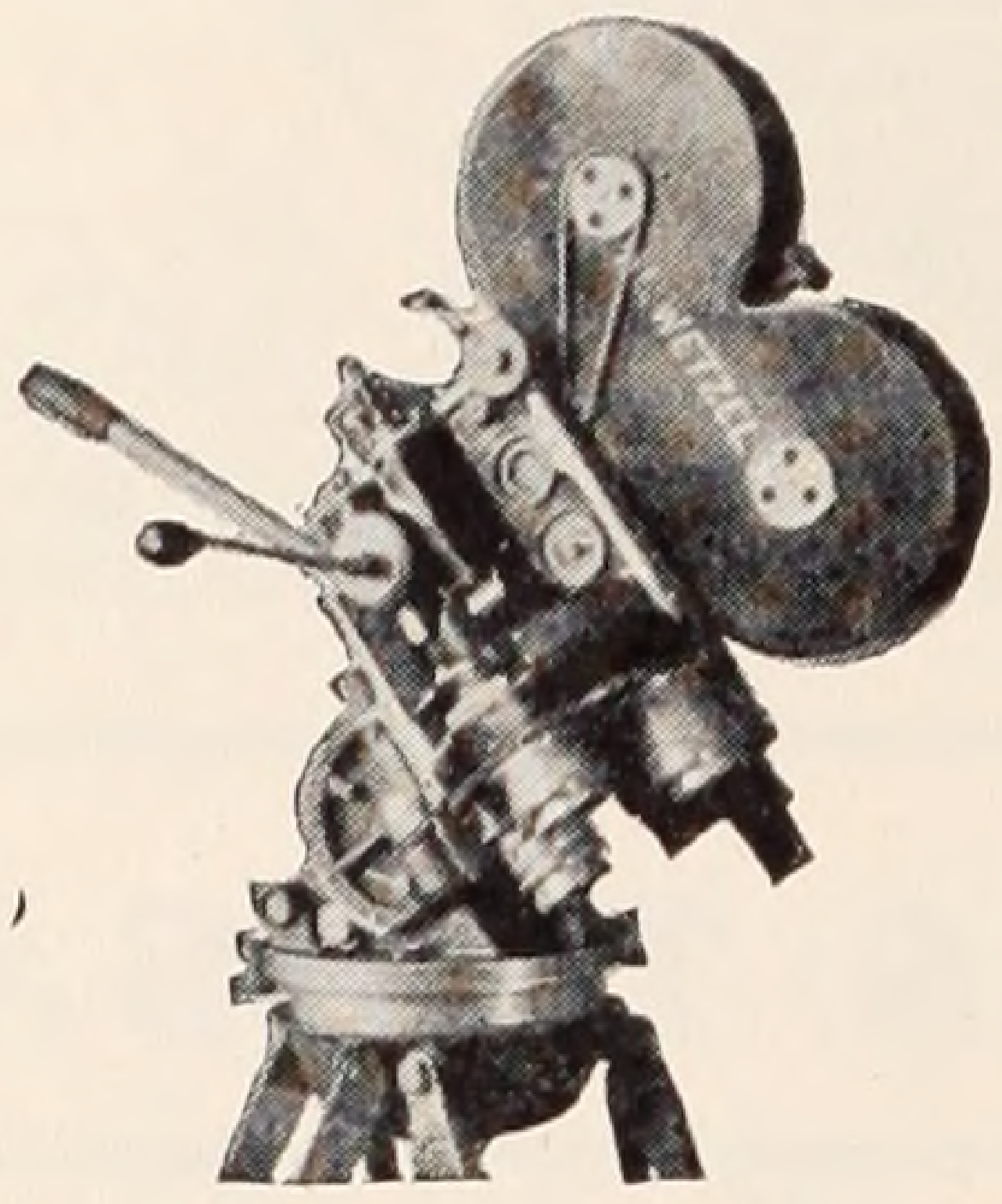
NOW gives you . . . greater speed, flexibility, and precision with ANY make of camera

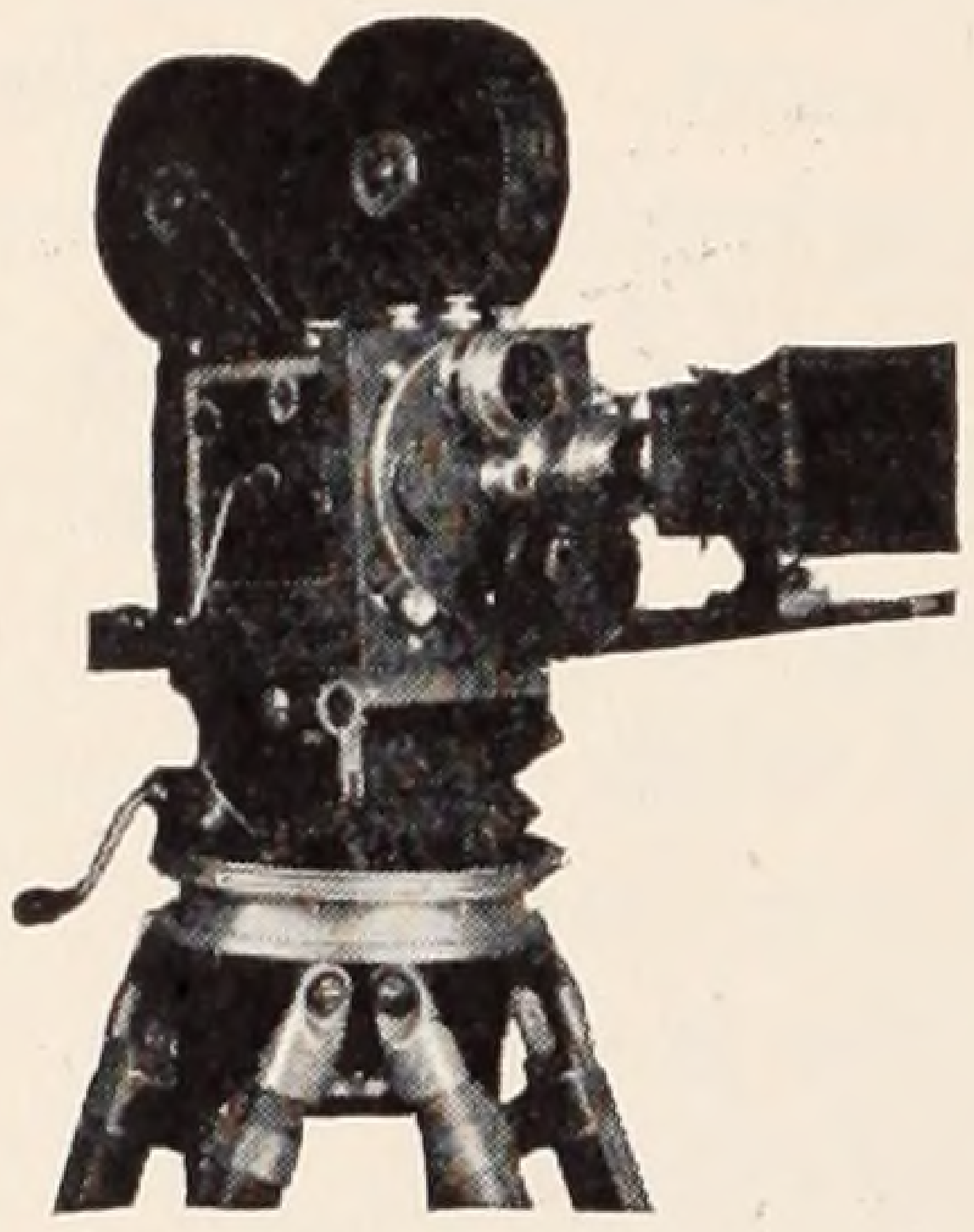
REALIZING that the principles of the Akeley Gyro mechanism, as embodied in the Akeley Camera, have contributed greatly to the mechanical success of motion pictures, we have placed on the market a tripod in which is contained an improved gyro mechanism adaptable to *any* make of motion picture camera. This Gyro mechanism now gives to any camera advantages until now exclusive with the Akeley Camera.

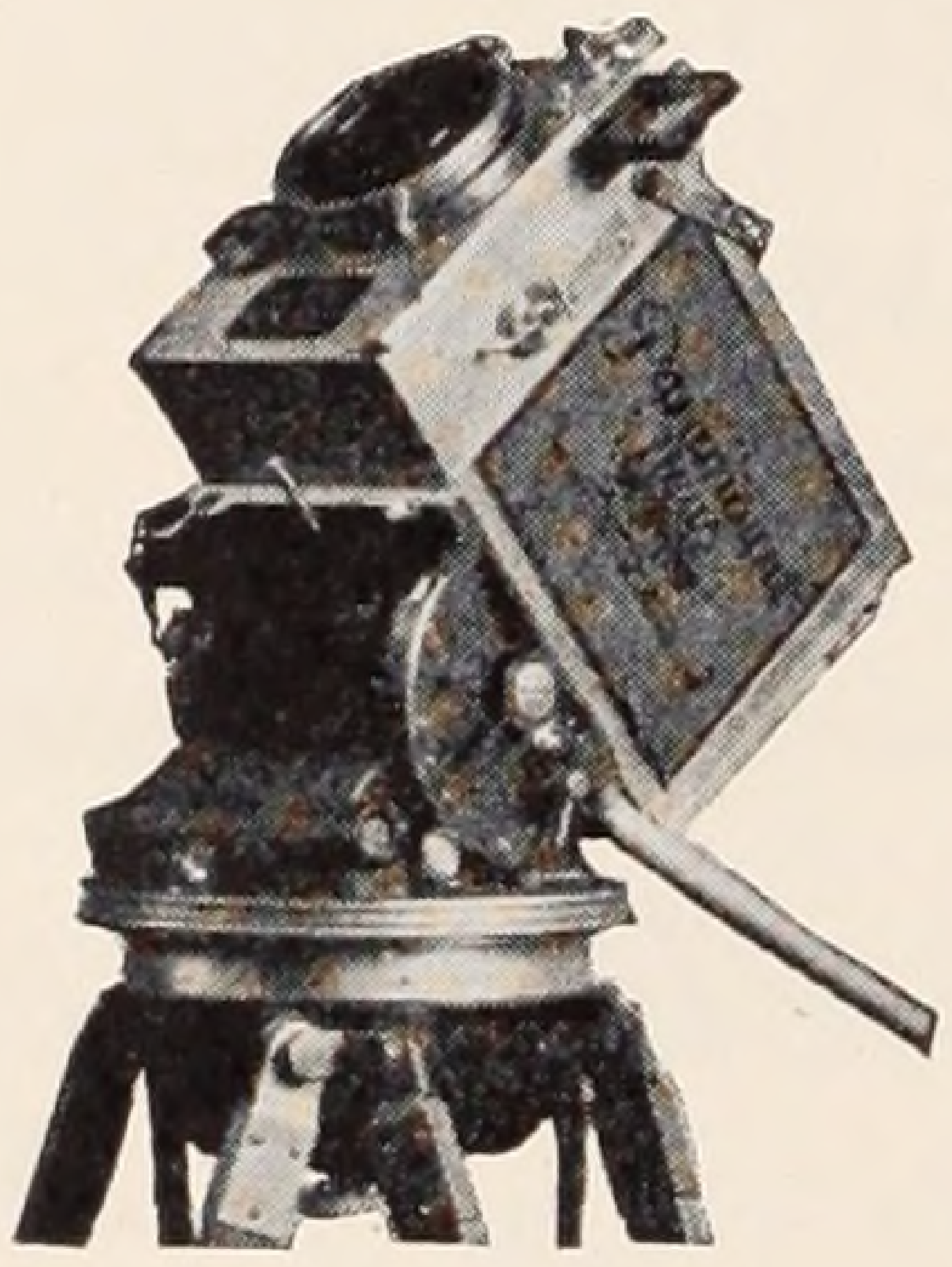
The new tripod adds to all cameras the flexibility of the Akeley pan and tilt mechanism eliminating the use of crank handles and friction devices which Mr. Akeley found to be unsatisfactory in properly photographing follow shots. There are three different speeds or resistances in the pan, any of which may be selected by the operator. To insure ease of action the Akeley mechanism is entirely ball bearing.

Altogether the Akeley Gyro Mechanism provides for the motion picture photographer a more convenient, a quicker and a more profitable method of taking news or studio pictures. It makes the unusual picture an every-day occurrence, the heretofore impossible shot a simple matter.

Write for our catalogue describing the Akeley Gyro Tripod in full and details of our time payment plan.







The three views above show Bell and Howell, Mitchell, and De Brie Cameras mounted on the Akeley Gyro Tripod. A very clear idea may be gained from these shots of the maximum upward and downward tilt given to the camera by this Tripod.

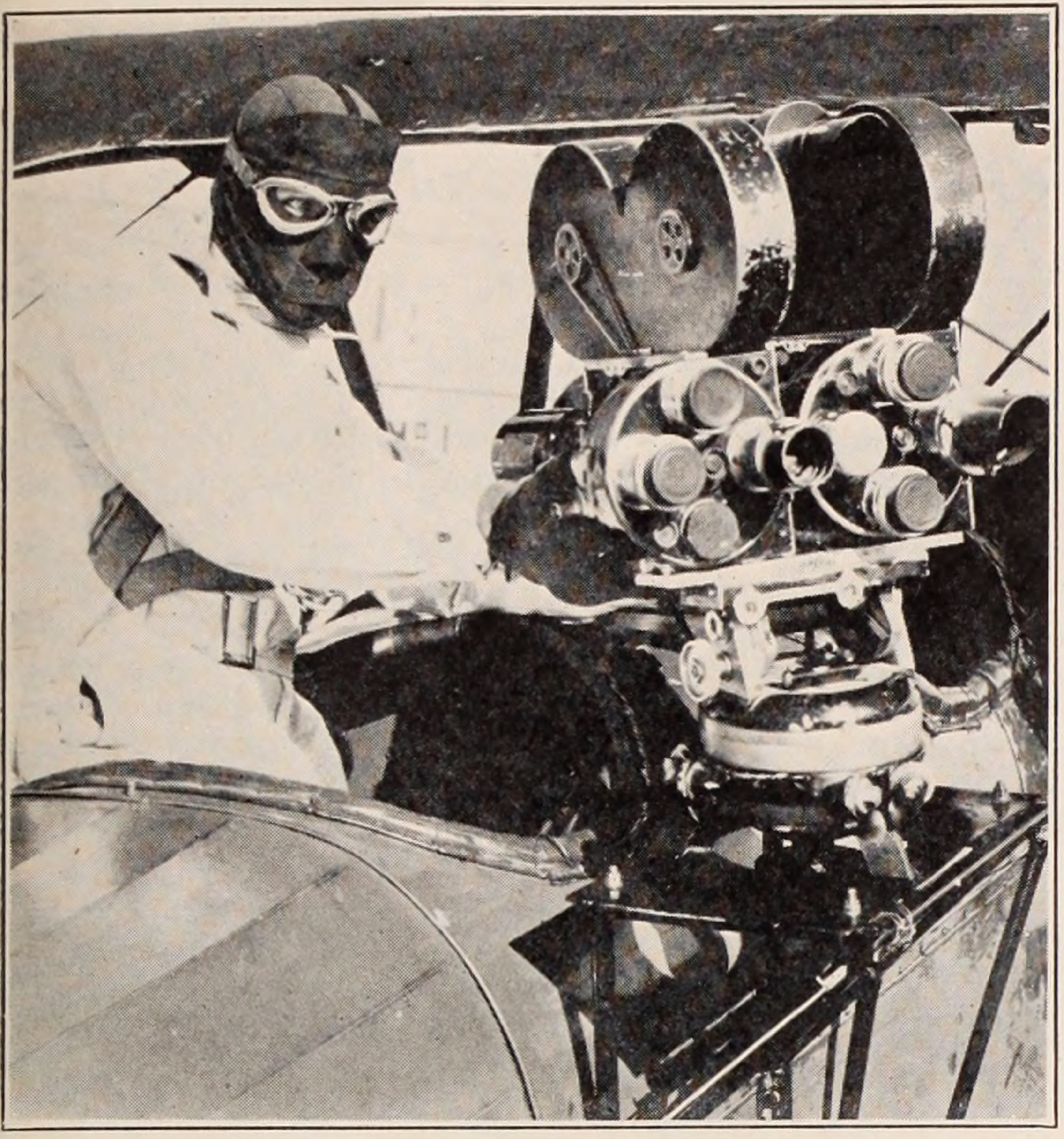
AKELEY CAMERA

INC.

The Akeley Universal Gyro Tripod

175 Varick Street New York City

The A. S. C. in the Air



Elmer G. Dyer, A. S. C., has just finished the aerial Akeley work on "The Winged Horseman," starring Hoot Gibson, a Universal release. This is a shot of Mr. Dyer showing him in his "ice armour" at his twin Bell & Howell cameras ready to go aloft. The mask is a protection against cold in the high altitudes. Mr. Dyer has had a brilliant career as an aerial cinematographer, very few pictures of this type having been made without his contribution to their photography.

Seven Reasons Why You Should Join the Society of Motion Picture Engineers

1—The S. M. P. E. is an internationally recognized organization of Motion Picture Engineers.

2—The S. M. P. E. is becoming an ever more important factor in developing, stabilizing, and standardizing the motion picture industry.

3—At two conventions each year reliable data concerning a wide range of subjects is presented long before it becomes available elsewhere.

4—Papers read at conventions are printed with full discussions in "Transaction Form" and distributed free to all members four times a year.

5—The S. M. P. E. affords unique opportunities for personal contact with leaders in the industry.

6—Membership requires recognized ability and therefore indicates a preferred standing in the profession.

7—The S. M. P. E. needs you and you need the S. M. P. E. Join now and you'll like it.

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249 McCall St. Toronto, Canada

The Mitchell's New Home

Great Business Expansion Forces Local Camera Corporation to Erect Big Plant—$300,000 Investment Involved

The great growth of the Mitchell Camera Corporation since its organization nearly eight years ago is evidenced by the fact that ground was broken at 1 o'clock Monday afternoon, January 21, for a new factory and administration building at 661 Robertson Avenue, Sherman.

The new factory site is about midway between Westwood and Hollywood and convenient to both Hollywood and the rapidly growing production center in the San Fernando Valley. The building, plans for which were drawn by the Truscon Steel Co., will contain 26,000 feet of factory floor space and will be constructed of concrete, steel and glass, absolutely earthquake and fire proof.

The floors will be of sawed wood blocks set in concrete slabs for the comfort of the factory operatives and every possible convenience will be installed. All four walls are set back at least five feet from the property lines, so that there will be no spot in the entire building more than twenty feet from daylight.

Left to right: Dwight Lanning, Fred Yost, Robt. H. Glenn, B. F. Shrympton, John E. Champion, President West Hollywood Chamber of Commerce, Harry Barrett, Secretary West Hollywood Chamber of Commerce. President Hy F. Boeger and Secretary George H. Mitchell, of the Mitchell Camera Corporation, breaking ground for their wonderful new home.

The building will front 100 feet on Robertson Avenue and the main factory structure will be 240 feet long and two stories high, with a three-story addition to be erected after the main factory building is occupied and in production. This three-story building will be occupied by the business offices, research department, etc.

Within ninety days from the ground-breaking the factory will be ready for the installation of $50,000.00 worth of absolutely new equipment, including one hundred and twenty electric motors to be used for driving the machines. There will be no line shafts. Every machine will have its individual motor.

By October 1 all the machinery of the present plant, 6011-6025 Santa Monica Boulevard, will be removed to the new quarters and the consolidated equipment will then represent the largest concern of the kind in the world.

The new building alone, exclusive of the realty, is costing $60,000.00, and the entire investment will aggregate approximately $300,000.00.

The Mitchell Camera Corporation, while devoting its resources to the perfection of its several types of cameras, has not been idle in other directions and, from time to time, news important to the technical side of the industry will be forthcoming from the Robertson Avenue plant, but no announcements will be made until the several products in process of perfection are ready for the market.

THE AMERICAN CINEMATOGRAPHER and the A. S. C. congratulates the Mitchell Camera Corporation upon attaining this great success in so short a time and bespeak for this wise, far-seeing and enterprising organization even greater success in the years to come. Personal congratulations are extended to President Hy. F. Boeger, president, and George Mitchell and their associates in the invention and development of the Mitchell camera which, within less than a decade, has come into international use.

GOERZ

CINE LENSES

Goerz Cine Lenses are being used all over the World because they are of

Superior Quality

We manufacture in our New York factory the

Kino—Hypar F. 2.7 and F. 3

in focal lengths from 1-inch to 4-inch

We also have an imported, superspeed series

Cinegor F. 2 and F. 2.5

in focal lengths from 1 3/8-inch to 4-inch and the telephoto series

Telestar F. 4.5

in focal lengths from 4 1/8-inch to 13 1/2 inch for long distance shots and close-ups

We make all kinds of trick devices, precision focusing mounts, focusing microscopes and special camera fittings.

We undertake the development of your own ideas along optical lines. Write us. A new catalogue, listing the complete line of Goerz Lenses and accessories, will be mailed on request.

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TACHAR 1:1,8

The High Speed Four Lens Anastigmat

ASTRO BERLIN

ON SALE BY

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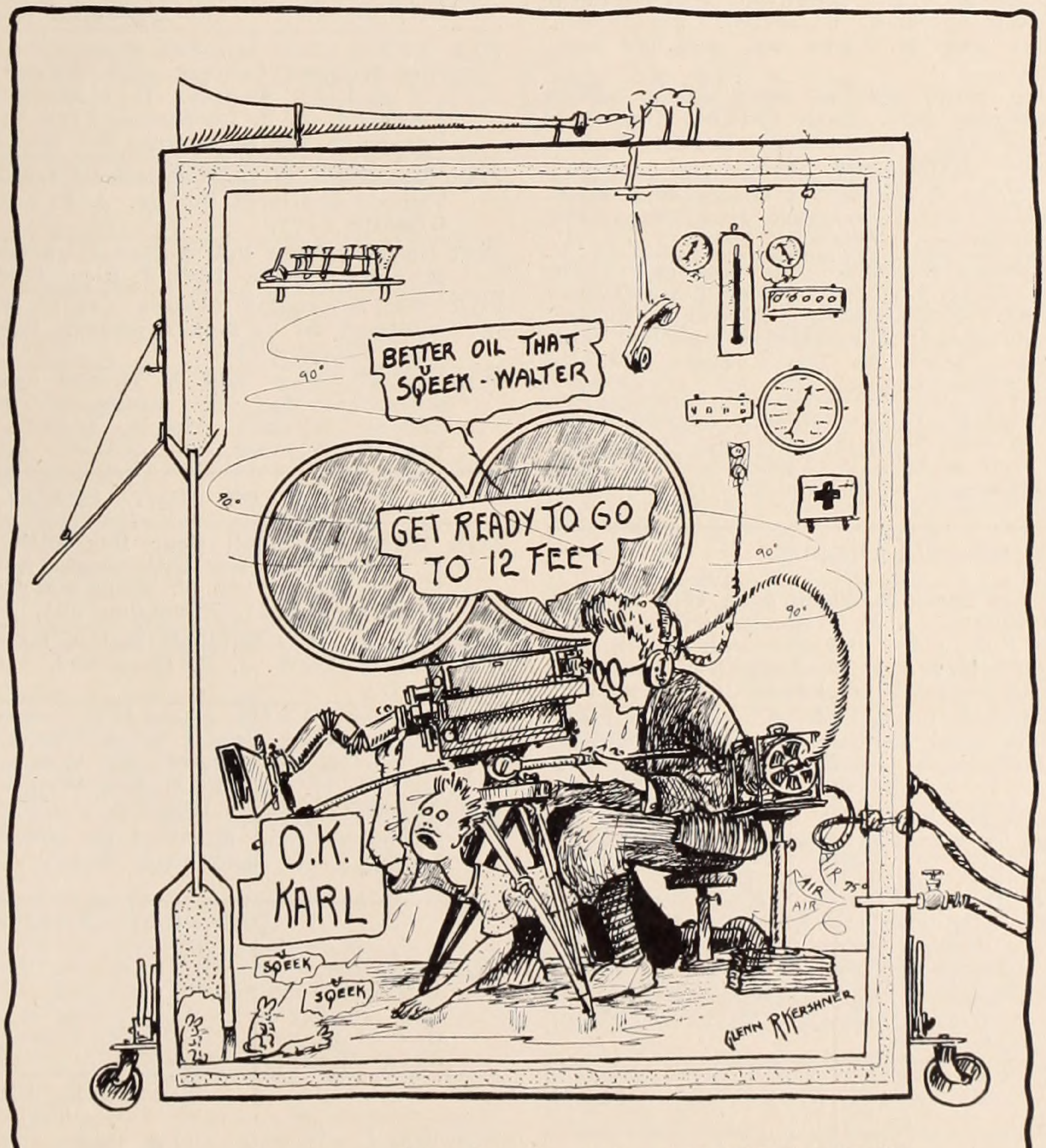

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